

**E. STUDY OF TRANSFER, DEVELOPMENT, AND  
OPERATION OF THE KERN WATER BANK**

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**Study of the Transfer,  
Development, and Operation  
of the Kern Water Bank**

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## **Introduction**

### **A. Overview of KFE Property**

In the early 1980s, the Department began exploring the feasibility of developing a State Water Project (SWP) groundwater storage facility in Kern County, which it called the Kern Water Bank (KWB). As envisioned, the KWB would consist of a series of “elements,” which would be geographically separate projects that would be operationally integrated. The largest of these elements, the Kern Fan Element (KFE), was to be developed first, followed by a number of local elements developed with several water districts in Kern County. After evaluating the feasibility of the KFE, in 1988, the Department purchased approximately 20,000 acres of land in the Kern Fan area from Tenneco West, Inc.

However, the Department encountered many legal, institutional, and political impediments to implementation of a groundwater storage facility on the KFE property. SWP contractors also expressed concerns regarding their ongoing costs for feasibility studies and ownership of the KFE property given their assessment of the likelihood of realizing a functional groundwater storage program. In 1993, uncertainties regarding the proposed groundwater storage facility ultimately convinced the Department to halt feasibility studies and design work on the project.<sup>i</sup> The uncertainties included proposed revisions of Delta water quality standards and measures to protect threatened and endangered species, which affected the SWP’s ability to pump water from the Delta for recharge on the KFE property. Expected changes in arsenic standards for drinking water also raised questions regarding the ability of the project to meet water quality standards for pump-in to the California Aqueduct.<sup>ii</sup> In addition to environmental and water quality issues, the Department and KCWA could not reach agreement on measures to comply with Water Code Section 11258, which required approval of local agencies for development of the groundwater banks. Later, the Department concluded that these constraints on Delta pumping made development of an SWP groundwater storage facility in the Kern Fan Element infeasible.<sup>iii</sup> In 1994, the potential of the Department’s proposed KFE for SWP groundwater storage remained unrealized.

In 1994, the Department and representatives of the agricultural and urban contractors negotiated a set of principles known as the Monterey Agreement. As part of these principles, the parties agreed to the Department’s sale or lease of the KFE property to designated SWP agricultural contractors, in exchange for the permanent retirement of 45,000 acre-feet (AF) of these contractors’ Table A amount. The Monterey Amendment, which was the amendment to the SWP contractors’ long-term water supply contracts that implemented the Monterey Agreement principles, provided for the State’s transfer of ownership of the KFE property to Kern County Water Agency (KCWA), and then to the Kern Water Bank Authority (KWBA), for local agency development and use as a groundwater bank.

### **B. Purpose**

The purpose of this report is to provide an independent study by the Department of the KWB, as required under the May 5, 2003 Settlement Agreement between the Planning and Conservation

League et al., the Department, and SWP contractors. Section III (F) of the Settlement Agreement requires the Department to prepare an independent study, and exercise “its judgment regarding the impacts related to the transfer, development, and operation of the KWB in light of the Kern Environmental Permits.” The agreement also requires that the study “identify SWP and any non-SWP sources of water deliveries to KWB.” To evaluate the impacts, the Department used the KFE property conditions and facilities that existed before the Department conveyed the KFE property to KCWA as the baseline for the evaluation.

## **II. Method**

Information from three sources was used to evaluate the transfer, development, and operation of the KWB by the Kern Water Bank Authority (KWBA). The first source was the Annual Compliance reports for 1999 through 2005. These reports are prepared each year by the KWBA and submitted to the California Department of Fish and Game (CDFG) and the U.S. Fish and Wildlife Service (USFWS), as required under their environmental permits, and were used in this study to determine what facilities were constructed, how the project is operated (recharge and extraction operation), identify vegetation, terrestrial and aquatic wildlife use of the site, and identify incidences of “take” in light of the Kern Environmental Permits. The second source was staff from KCWA and KWBA, who were consulted to provide additional information on recharge and recovery activities of SWP and non-SWP water at the KWB, and to evaluate where water could have been banked in Kern County in the absence of the KWB. The third source was personnel from CDFG and USFWS, who were contacted to determine if the resources agencies had any concerns with the development or operation of the KWB in light of the KWB environmental permits.

## **III. Existing Conditions**

The KFE property <sup>1</sup> is located in Kern County, about 12 miles southwest of the City of Bakersfield (Figure 1). It consists of approximately 20,000 acres of gently sloping land overlying the Kern River Alluvial Fan. Surrounding lands are used primarily for agriculture, habitat preserves, or other water banking programs. Prior to the development of the KWB, most of the land was used for agriculture, and irrigation water was provided by surface water deliveries by the former James-Pioneer Improvement District of North Kern Water District, and by groundwater pumping. Agricultural water supplies for lands surrounding the KWB are provided by Rosedale – Rio Bravo Water Storage District for most lands to the north, by Kern Delta Water District for lands to the southeast, by Henry Miller Water District for lands to the

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<sup>1</sup> The court referred to the KFE property as the KWB in its decision. The KFE property consists of the approximately 20,000 acres acquired by the Department from Tenneco West, Inc. The property was acquired for the purpose of developing the KFE, one of a series of groundwater banking “elements” that together would constitute the KWB. As envisioned, the eight or so elements of the KWB would be geographically separate projects that would be operationally integrated. Therefore, the terms KFE and KWB are not interchangeable, and what is now called the KWB is only a portion of the KWB envisioned by the Department. For simplicity, this document will use the term KWB to refer to the groundwater bank developed by the KWBA on the KFE property, and the term KFE property to refer to the 20,000 acres of land acquired by the Department.

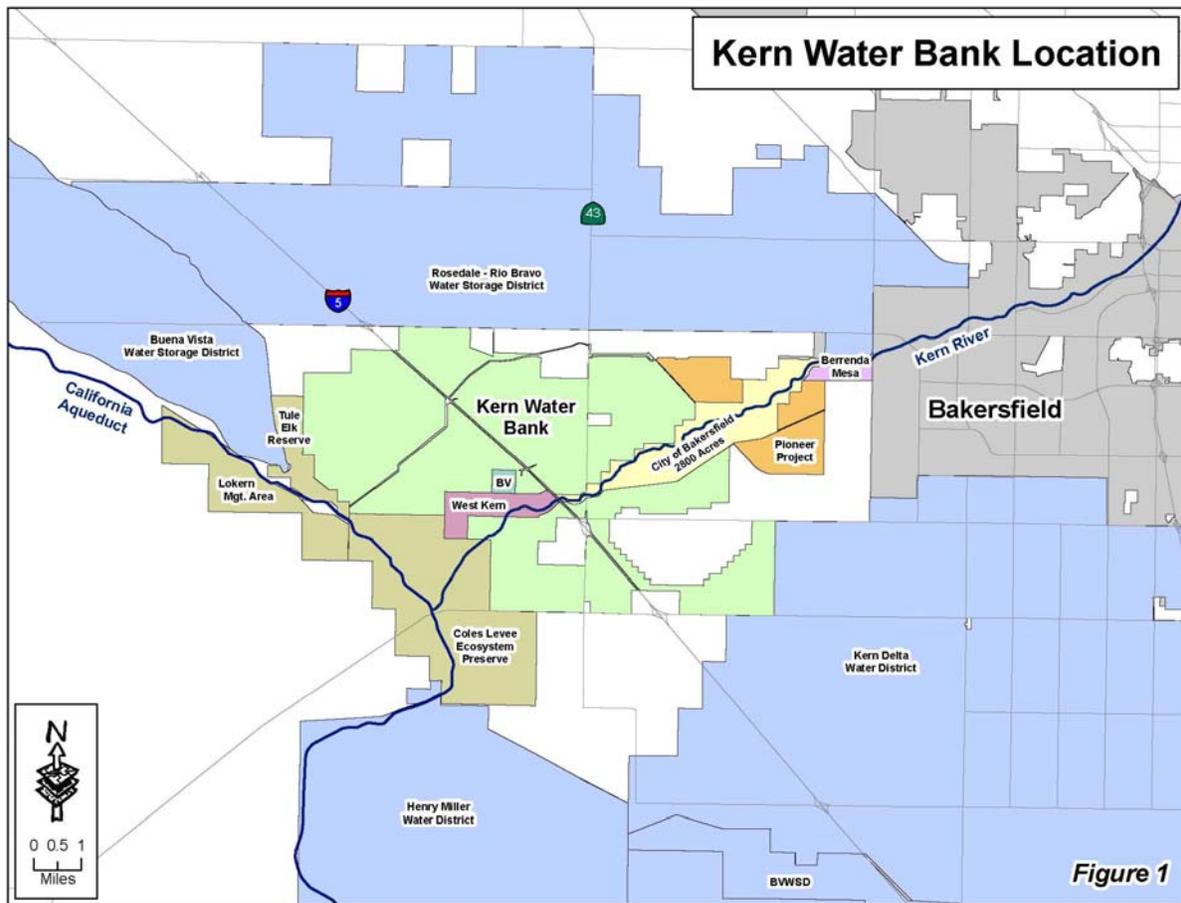


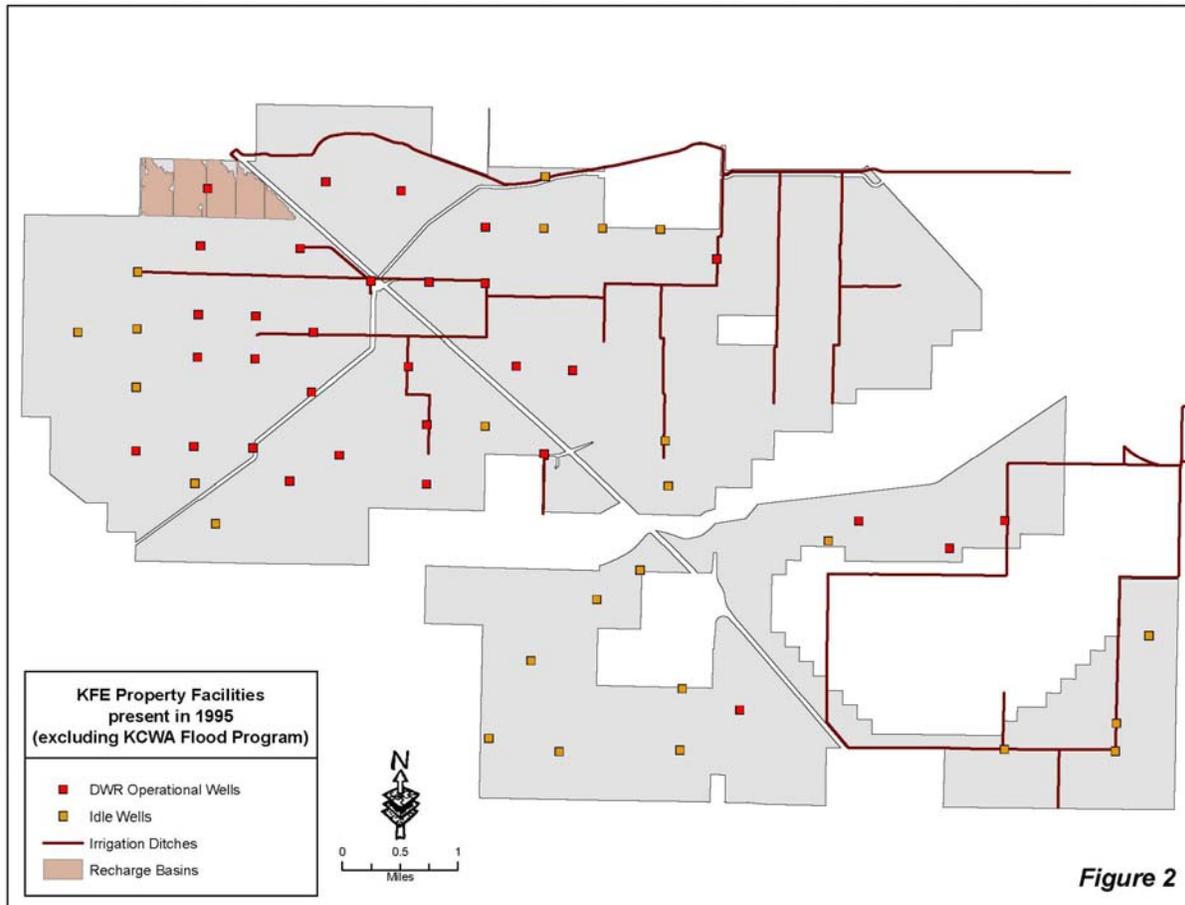
Figure 1

south, and by Buena Vista Water Storage District for lands to the northwest. The Tule Elk State Reserve, Coles Levee Ecosystem Preserve, and Lokern Management Area are located west and south the KWB.

The KWB is one of several groundwater banks in Kern County. Other groundwater banks include: Berrenda Mesa Project (operational since 1983); City of Bakersfield 2,800 Acre Recharge Basin (operational since 1978); Pioneer Project, including Kern River Channel (operational since 1995); West Kern/Buena Vista (operational since 1978); Arvin-Edison Water Storage District (operational for groundwater banking for other districts since 1990); and Semitropic Water Storage District (operational for groundwater banking for other districts since 1990). With the exception of the Arvin-Edison and Semitropic groundwater banks, all of the projects are located adjacent to the KWB on the Kern River Alluvial Fan. While KWB provisions allow for lower priority use by others (see Section V.B.4), such use has only been by KCWA member agencies and has been very limited in scope. The Arvin-Edison and Semitropic banks allow participation by non-Kern County entities; the other banks mentioned above allow participation by Kern County entities only.

## A. Existing KFE Property Facilities

The facilities that existed on the KFE property in early 1995 are shown in Figure 2.



### 1. Recharge

Tenneco constructed approximately 300 acres of recharge ponds in the northwestern portion of the KFE property prior to its acquisition by the Department in 1988. These ponds are known informally as the Stockdale Highway Ponds. The Department did not construct any recharge ponds on the KFE property during its ownership of the property.

### 2. Recovery

Sixty-five agricultural wells were present on the KFE property when it was acquired by the Department in 1988. During the Department's ownership of the property, it initiated a program of refurbishing some of these existing wells, so that it could recover water it had purchased from La Hacienda, Inc.<sup>2</sup> At the time the property was transferred to KCWA, 31 of the 65 existing

<sup>2</sup> The purchase was of 98,000 acre-feet of stored Kern River water, which had originally be recharged at the City of Bakersfield's 2800 acre project. (KWB First Stage KFE Feasibility Report, December 1990)

wells were considered operable, although 3 of these were not connected to any conveyance facilities. The remaining 34 were idle wells in various states of disrepair.

### **3. Conveyance**

At the time the Department acquired the KFE property in 1988, the property included a number of conveyance facilities that had been constructed primarily for the delivery of irrigation water for the agricultural activity occurring then and historically on the property. These facilities were not constructed for water bank operations of recharge and recovery, and many were not suitable for these purposes. An exception was the Pioneer Canal, which could have been used to deliver water for recharge to the existing approximately 300 acres of Stockdale Highway Ponds. Other nearby facilities, including the Cross Valley Canal, the City of Bakersfield's Kern River Canal, and Buena Vista WSD's Alejandro Canal, could have been used to convey water recovered from the 31 operable wells on the KFE property. However, these facilities were owned by others and could only have been used for banking purposes when unused capacity was available. During the Department's ownership of the property, the Department constructed conveyance facilities of small capacity to convey water recovered from certain of the individual operable wells to these larger nearby conveyance facilities.

#### **B. KCWA Flood Emergency Program**

In 1995, KCWA requested and was granted the use of the KFE property for emergency spreading of water to mitigate projected flooding of agricultural lands due to high flows on the Kern and Kaweah Rivers. KCWA requested use of approximately 3,200 acres of the KFE property for the emergency delivery and controlled spreading of local floodwater flows. KCWA proposed spreading water from the Kern and Kaweah Rivers onto existing Kern County spreading basins (including KCWA's Pioneer Project, the City of Bakersfield's 2,800 acres, Berrenda Mesa Ponds, and Rosedale-Rio Bravo Ponds), and diverting the remaining flood flows (up to 500 cubic feet per second (cfs)) onto a portion of the Department's KFE property. KCWA proposed constructing up to 2,300 acres of recharge ponds on 3,200 acres of the property.

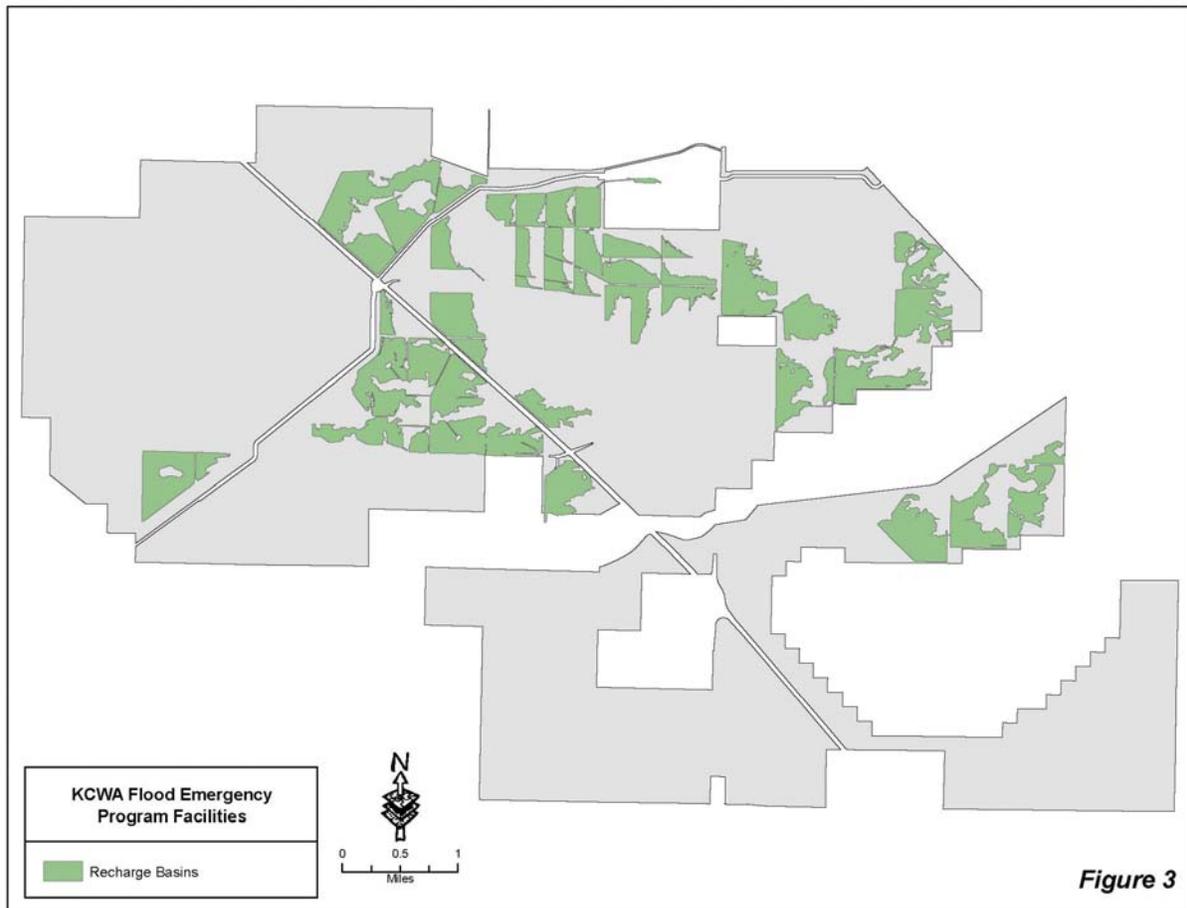
The Department conditioned its approval of KCWA's construction plans upon KCWA satisfaction of the endangered species acts requirements. In consultation with the USFWS and CDFG, KCWA performed biological surveys of the areas that it proposed to flood in order to avoid any threatened or endangered species, in compliance with federal and State endangered species acts. KCWA obtained endangered species agreements with USFWS and CDFG to develop 2,300 acres of spreading ponds. The Department added additional conservation conditions in a separate agreement. KCWA prepared a CEQA Negative Declaration and filed a Notice of Exemption for the project's CEQA compliance. Subsequently, the Department approved<sup>3</sup> a second request by KCWA to divert water onto an additional 1,800 acres of spreading ponds on an additional 5,000 acres of KFE land. The Department also agreed to extend its initial agreement with KCWA to March 31, 1997.<sup>4</sup>

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<sup>3</sup> Letter, John J. Silveira, DWR to Thomas Clark, KCWA; June 2, 1995

<sup>4</sup> Letter, Robert G. Potter, DWR to Thomas Clark, KCWA; March 11, 1996

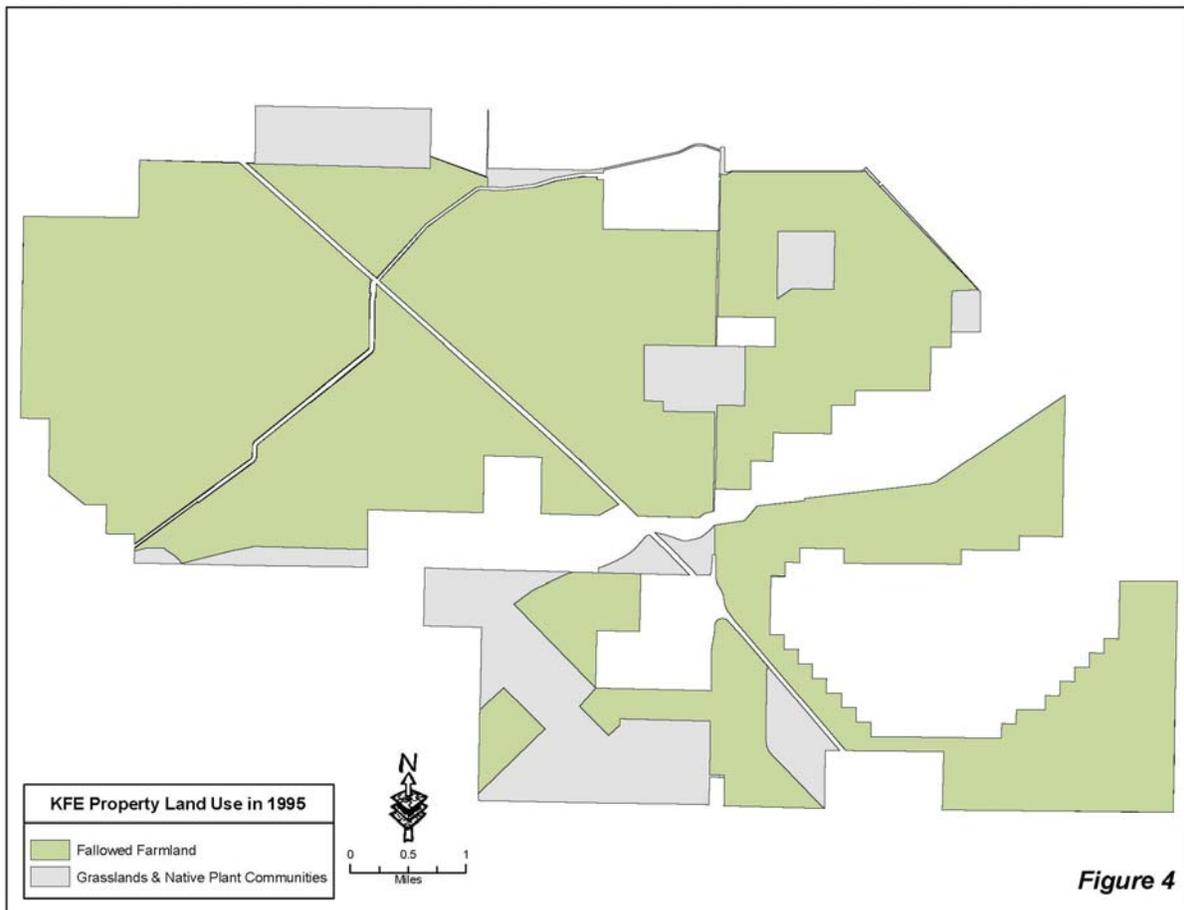
As a result of these agreements, in 1995 KCWA constructed 1,518 acres of recharge ponds on the initial 3,200 acres of KFE property, and 1,516 acres of recharge ponds on the additional 5,000 acres of KFE land (Figure 3). Under the flood emergency program, about 230,000 AF of water was recharged in 1995 and about 144,000 AF in 1996.



### C. Land Use

Prior to the Department's purchase of the KFE property in 1988, approximately 17,068 acres of the property was under extensive cultivation.<sup>iv</sup> The remaining property contained 1,515 acres of isolated sensitive native plant communities (valley saltbush scrub, Great Valley mesquite scrub and valley sacaton grassland) and 1,317 acres of non-native grassland, which had been leased for oil recovery facilities. No wetland habitat was present in the project area, except for the canals used to convey water for agricultural use.

A Memorandum of Understanding was signed between the Department and KCWA on March 25, 1987, that provided for the phase out of all agricultural production on the KFE property by the end of 1993. In fact, one of the tenants' leases was terminated in 1989. Then in 1991, at the peak of the drought, all the remaining tenant leases were terminated, and thereafter the agricultural lands were fallowed. The land use on the KFE property in 1995 is shown in Figure 4.



#### **IV. Transfer of KFE Property from the Department**

By 1994, the potential of the Department’s proposed KFE for SWP groundwater storage remained unrealized. As is described in more detail in Section I.A, by this time the Department had concluded that constraints on Delta pumping and a number of other uncertainties made development of an SWP groundwater storage facility on the KFE property infeasible. In 1994, the Department and representatives of the agricultural and urban contractors negotiated a set of principles, subsequently implemented through the Monterey Amendment, that provided for the State’s transfer of the KFE property to KCWA, and then to the KWBA, for local agency development and use as a groundwater bank, as discussed in more detail below.

##### **A. Monterey Amendment**

The Department deferred development efforts of the KFE in the early 1990s. Subsequently, the Monterey Amendment provided for the State’s transfer of ownership of the KFE property to KCWA for local agency development and use as a groundwater bank, in exchange for the permanent retirement of 45,000 AF of SWP Table A amount by KCWA and Dudley Ridge WD.

Article 52 of the Monterey Amendment states that:

- a) The State shall convey to the Kern County Water Agency (KCWA) in accordance with the terms set forth in the agreement between the State of California Department of Water Resource and Kern County Water Agency entitled, "Agreement for the Exchange of the Kern Fan Element of the Kern Water Bank" (the Kern Water Bank Contract), the real and personal property described therein.
- b) Subject to the approval of KCWA, other contractors may be provided access to and use the property conveyed to KCWA by the Kern Water Bank Contract for water storage and recovery. Fifty percent (50 %) of any project water remaining in storage on December 31, 1995, from the 1990 Berrenda Mesa Demonstration Program and the La Hacienda Water Purchase Program shall be transferred to KCWA pursuant to the Kern Water Bank Contract. The remaining fifty percent (50%) of any such water (approximately 42,828.5 AF) shall remain as project water and the State's recovery of such project water shall be pursuant to the provisions of a separate recovery contract. Any other Kern Water Bank demonstration program water shall remain as project water and the State's recovery of such water shall be pursuant to the provisions of the respective contracts for implementation of such demonstration programs.

Article 53(i) of the Monterey Amendment states, in part, that:

- i) On January 1 following the year in which such Monterey Amendments take effect and continuing every year thereafter until the end of the project repayment period: (i) Kern County Water Agency's (KCWA) annual entitlement for agricultural use as currently designated in Table A-1 of its contract shall be decreased by 40,670 AF; (ii) Dudley Ridge Water District's (DRWD) annual entitlement as currently designated in Table A of its contract shall be decreased by 4,330 AF; and (iii) the State's prospective charges (including any adjustments for past costs ) for the 45,000 AF of annual entitlements to be relinquished by KCWA and DRWD thereafter shall be deemed to be costs of project conservation facilities and included in the Delta Water Charge for all contractors in accordance with the provisions of Article 22.

In accordance with the Monterey Amendment, the Department conveyed the KFE property to KCWA in exchange for KCWA and DRWD permanently retiring a total of 45,000 AF of agricultural Table A amounts. On December 13, 1995, the same date the Department executed the Monterey Amendments of KCWA and DRWD, the Department executed the "Agreement for the Exchange of the Kern Fan Element of the Kern Water Bank" between the Department and KCWA. This agreement provided the specific terms and conditions for the transfer of the KFE property to KCWA.

## **B. Exchange Agreement between the Department and KCWA**

The "Agreement for the Exchange of the Kern Fan Element of the Kern Water Bank" between the Department and KCWA was executed on December 13, 1995. This agreement provided for

the transfer of the KFE acreage and its fixtures from the Department to KCWA in exchange for agricultural contractors' permanent reduction and retirement of 45,000 AF of their SWP Table A amount. The agreement transferred the property to KCWA and identified certain KCWA obligations, covenants, and agreements associated with the property, including KCWA assumption of responsibility for the Department's endangered species agreements, in total.

It was intended that KCWA would transfer the KFE property to a joint powers authority made up of those entities that had retired a portion of their Table A amounts. Therefore, the exchange agreement between the Department and KCWA included a provision that stated that the parties' agreed that KCWA could transfer all or a portion of the property and assign its rights and obligations to transferees who concurrently executed an agreement accepting the transfer and assignment and assumption of KCWA's obligations, covenants, and agreements.

### **C. Conveyance Agreement from KCWA to KWBA**

Simultaneous with the December 13, 1995, execution of the exchange agreement between the Department and KCWA, KCWA executed an agreement between it and the Kern Water Bank Authority (KWBA). This agreement transferred the KFE property from KCWA to the KWBA:<sup>5</sup> to develop, operate, and maintain the KFE property as a local groundwater banking project, which they called the Kern Water Bank (KWB); to develop and improve the KWB for the importation, percolation and storage of water in underground aquifers for later extraction, transportation, and; for the beneficial use of Project Participants.<sup>6</sup> KWBA assumed control of the KFE property and prepared a plan for development fo the property as a groundwater bank and an operating plan to bank available water from three sources – the Kern River, the Central Valley Project's (CVP) Friant-Kern Canal, and the SWP.

## **V. KWBA's Development of KWB**

### **A. Environmental Documents and Permits**

#### **1. CEQA**

A final programmatic EIR on the Monterey Agreement ("Monterey Agreement EIR") was issued in October 1995. The Monterey Agreement EIR describes, among other things, the environmental impacts of the development of a groundwater bank on the KFE property, including construction of banking facilities and operation of a groundwater bank. The KWBA, as a responsible agency, approved the Monterey Agreement EIR on October 30, 1995. The principles of the Monterey Agreement were implemented through the Monterey Amendment. As described in Section IV above, upon execution of the Monterey Amendment, the Department

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<sup>5</sup> The Kern Water Bank Authority is a joint power authority formed pursuant to California Government Code section 6500 et seq.

<sup>6</sup> The transfer of the KFE property from KCWA to KWBA was made possible by provisions specified in Section 3, subsection 3.3 (Immediate Reconveyance) of the Kern Water Bank Contract, dated December 13, 1995.

transferred the KFE property to KCWA, which simultaneously transferred the property to the KWBA.

The KWBA prepared specific plans for the development and operation of a groundwater bank on the KFE property, referred to by the KWBA as the Kern Water Bank (KWB). The CEQA guidelines indicate that “subsequent activities in a program must be examined in the light of the programmatic EIR to determine whether an additional environmental document must be prepared.” A subsequent EIR is only allowed if certain findings are made, which was not the case for the proposed KWB. Instead, an addendum to the Monterey Agreement EIR was prepared pursuant to §15164 of the guidelines. This addendum addressed the environmental issues related to development and construction of the KWB that had not been addressed in the programmatic EIR. The primary focus of the addendum was the Kern Water Bank Habitat Conservation Plan (HCP) and the Natural Community Conservation Plan (NCCP), which primarily address the impacts of the project on endangered species. However, the addendum also addressed the impact on cultural resources, groundwater impacts on surrounding landowners, and mosquito abatement, among other things. The HCP/NCCP is discussed in more detail below.

After completion of the environmental analysis, and establishment of appropriate mitigation measures, the KWBA concluded that the entire project, as revised by the mitigation measures, would have no significant effect on the environment. A Notice of Determination was filed July 4, 1996, and no legal challenge was filed.

## **2. CESA/ESA**

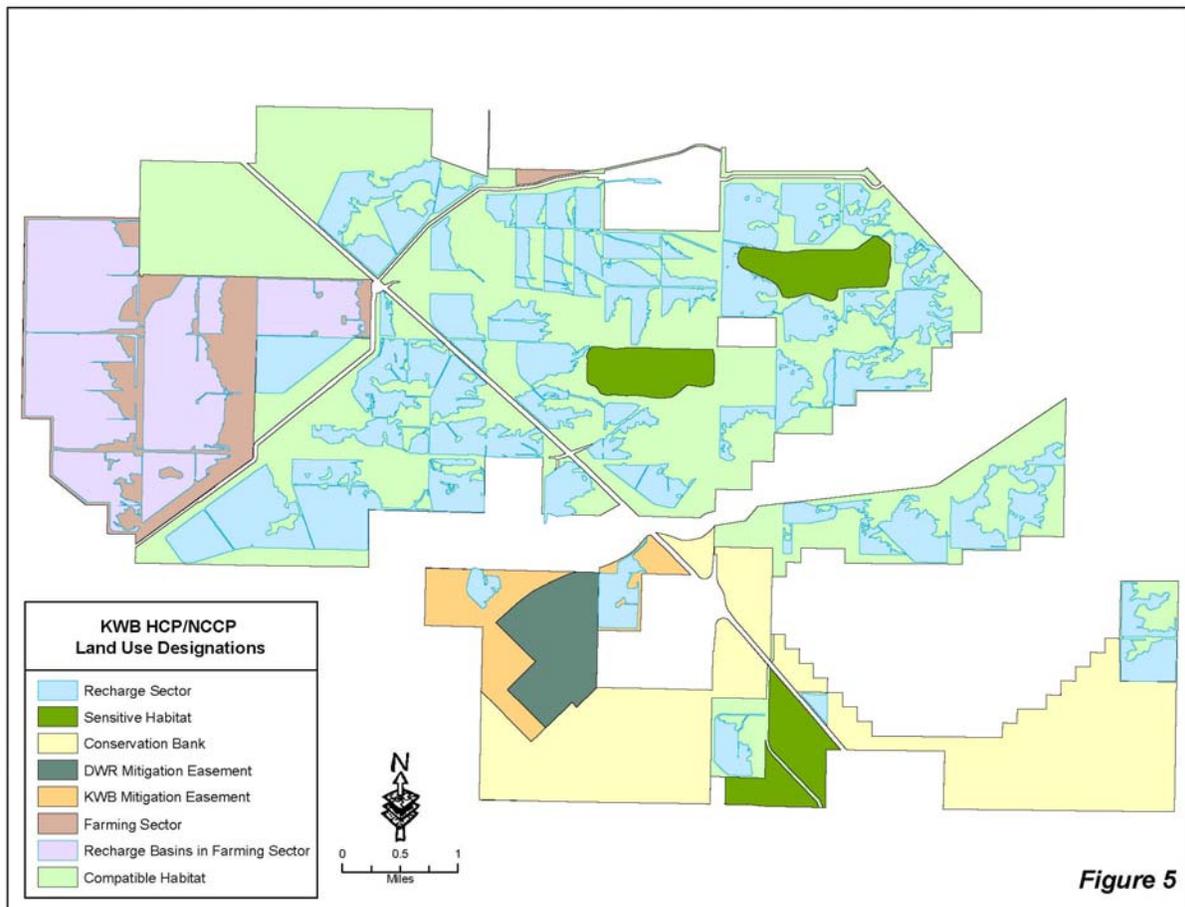
### **a. Permits**

To allow the management and operation of the KWB in accordance with the incidental take of endangered, threatened and certain other listed species, KWBA applied to the USFWS for two permits pursuant to the federal Endangered Species Act, and to the CDFG for two management authorizations pursuant to the California Endangered Species Act and the Natural Community Conservation Planning Act. One permit and one management authorization (the Project Permit/Authorization) is related to the KWB project. The other permit and management authorization (the Master Permit/Authorization) is related to a conservation bank to be used as potential mitigation for activities by third parties within designated areas of the Southern San Joaquin Valley. The conservation bank can be used to provide mitigation for the incidental take of listed species by qualified third parties for activities that take place within Kern County, the Allensworth area of Tulare County, and the Kettleman Hills area of Kings County. Both Permits and both Master Authorizations are for a period of 75 years. The agencies prepared a Habitat Conservation Plan/Natural Community Conservation Plan (HCP/NCCP), an implementation agreement (IA), and a federal environmental assessment (EA) as part of the permit/authorization process.

**b. HCP/NCCP**

To protect endangered species on the property, the KWBA, the USGWS, and the CDFG developed the HCP/NCCP to preserve and restore habitat for threatened, endangered, and protected species. The HCP/NCCP permits certain uses for the KFE property and designates general areas (referred to as “sectors”) and acreages for those uses (Figure 5 and Table 1).

<b>Table 1. HCP/NCCP Land Use Designations</b>	
	<b>AREA (In Acres)</b>
Recharge Basins	5,900
Other Water Banking Facilities	481
Compatible Habitat	5,592
Sensitive Habitat	960
Department Mitigation Land	530
Farming (including recharge ponds)	3,170
Conservation Bank	3,267
<b>TOTAL</b>	<b>19,900</b>



One of the HCP's primary management tools is its Vegetation Management Plan. The Plan incorporates an adaptive management approach to improve upland habitat for the threatened and endangered species that are found on the property. The program uses methods that are compatible with the water banking activities and economically feasible for a large-scale project. Since desert species prefer low-density vegetation, the primary method used to control vegetation has been grazing and burning. To control tumbleweeds (the largest problem), KWBA has timed grazing and burning activities to promote desired native plant growth and retard the growth of the tumbleweeds.

Water banking has also caused a resurgence in wetland habitat and the return of waterfowl to the area. To date, more than 40 new species of birds have been sighted on the KFE property, including the Caspian tern, the white-faced ibis, the double-crested cormorant, and the tri-colored blackbird.

The Implementation Agreement of the KWBA HCP/NCCP requires the KWBA to prepare and submit an Annual Report to the USFWS and the CDFG that includes the following information from the previous year:

- A summary of all activities on the KWB, including construction, and operation and maintenance of water recharge and water extraction facilities;
- A summary of Take of Covered Species and Covered Habitat;
- A summary of mitigation measures implemented;
- Results of studies completed;
- Results from the implementation of monitoring programs;
- Results from the implementation of avoidance and minimization measures;
- A report regarding the status of the Species Viability Fund;
- A copy of the KWBA's financial report evidencing KWBA's ability to fund its affirmative obligations under the KWBA HCP/NCCP and the Implementation Agreement; and
- A certification from a responsible officer of the KWBA.

Exhibit H of the HCP/NCCP requires KWBA to meet the Minimization of Impacts Requirements during construction and repair activities. The following actions are specified in Exhibit H:

- The delineation of all construction zones;
- Oversight of all phases of the construction on a daily basis by KWBA inspectors;
- Compliance with minimum construction standards for canals;
- An orientation program for all KWBA employees and contractors that explains endangered species concerns, notification requirements for dead, injured, or entrapped listed animals, and on-going practices requirements (e.g. construction site review and traffic, food and dog control);
- Monitoring major construction activities by a qualified biologist; and
- Biological surveys to identify San Joaquin kit fox dens, burrows occupied by burrowing owls, and signs of the presence of fully-protected species.

Table 2 shows the amount of land disturbance that was estimated in the HCP/NCCP to accompany the construction of infrastructure on the KWB, and the amount of disturbance that has actually occurred. Land disturbance is tracked in all land use sectors on the KFE property but the Farming Sector.<sup>7</sup> Note that permanent water banking facilities occupy only 258 acres.

<b>Table 2. Estimated versus actual land disturbance resulting from recharge/recovery facilities through December 2005</b>		
	<b>KWB HCP/NCCP Estimated Disturbance (acres)</b>	<b>Actual Disturbance (through 12/31/2005) (acres)</b>
<b>Recharge Basins in Recharge Sector*</b>	<b>5,900</b>	<b>4,699</b>
<b>Permanent Water Banking Facilities</b>		
Recovery Facilities		
Wells - Existing Hooked Up	28	14
Wells - Existing Not Hooked Up	38	6
Wells - Proposed New	66	21
Conveyance Facilities		
Proposed-Lined	87	0
Existing – Unlined	225	117
Supply/Recovery Canal	73	75
Pump Stations	12	2
Kern River Reverse Flow		
Earthwork (levees)	4	0
Pump Stations		
Kern River	10	0
City of Bakersfield	4	0
New Roads	0	23
<b>Subtotal</b>	<b>547</b>	<b>258</b>
<b>Temporary Disturbed Areas</b>		
Canal Construction	73	68
Recovery Wells	0	16
Pipelines – Proposed	218	144
<b>Subtotal</b>	<b>291</b>	<b>228</b>
<b>Total</b>	<b>6,738</b>	<b>5,185</b>
* Does not include 2,415 acres of recharge ponds located in the Farming Sector.		

Source: Kern Water Bank Authority. Annual Report, May1, 2006

## **B. Other Agreements and Restrictions**

### **1. Statement of Principles – March 1995**

A Statement of Principles (SOP) establishing several guidelines for a later agreement amongst the KWB participants on the establishment of a public agency to own, develop, operate and maintain the KWB project was agreed to on March 31, 1995. The key provisions of the SOP are:

<sup>7</sup> Land disturbance in the Farming Sector is not tracked since it was anticipated in the KWB HCP/NCCP to be disturbed from farming or other activities. In fact, with the exception of 45 acres currently farmed for the CDFG for an annual Heritage Game Bird hunt, no farming has occurred in the Farming Sector. Instead, this acreage has developed into exceptional upland and wetland habitat.

- An allocation of the amount of firm SWP Table A amounts to be permanently retired by each of the participants, and a mechanism for other KCWA Member Units to participate in the KWB as the project moved forward;
- A statement that the KWB's primary purpose is to augment water supplies for KWB participants;
- A statement indicating the proposed public agency will be responsible for all KWB costs;
- The establishment of priorities for the use of the KWB by others;
- A statement that the KWB will be operated pursuant to the pending *Memorandum of Understanding Regarding Operation and Monitoring of the Kern Water Bank Groundwater Banking Program* (see V.B.3. below);
- A mechanism to establish agreements to share Cross Valley Canal capacity amongst other banking projects; and
- The establishment of covenants for the limitation on the future consumptive use of groundwater by the property and restrictions on the future sale, transfer, lease, etc., of the property as long as KCWA has determined that the property can be used economically for groundwater storage and recovery.

## **2. Joint Powers Agreement – October 1995**

The entities that permanently retired a portion of their SWP Table A amounts (i.e., SWP contractors KCWA and Dudley Ridge WD, and KCWA member agencies Semitropic WSD, Tejon-Castac WD, and Wheeler Ridge-Maricopa WSD, and Westside Mutual Water Company, LLC) formed a joint powers authority called the Kern Water Bank Authority on October 16, 1995, with the execution of a Joint Powers Agreement (JPA). The JPA:

- Created the KWBA and established its term, purpose and powers;
- Established the internal organization of the KWBA (i.e., governed by a Board of Directors);
- Established procedures for handling KWBA's finances;
- Described the KWBA's KWB project and established participant rights in the project directly proportional to the amount of Table A water each participant retired to acquire the project;
- Established the relationship between the KWBA and its participants (e.g., indemnities, withdrawals, etc.); and
- Established other procedures necessary to the operation of the KWBA (e.g., amendment procedures, dispute resolution procedures, etc.)

Table 3 lists the Table A amounts retired by each KWBA participants and their corresponding ownership allocations.

<b>Table 3. Kern Water Bank Authority Participants</b>		
<b>Participants</b>	<b>Table A Amount Retired (AF)</b>	<b>Allocation (%)</b>
Dudley Ridge WD	4,330	9.62
Improvement District 4	4,330	9.62
Semitropic WSD	3,000	6.67
Tejon-Castac WD	900	2.00
Westside Mutual Water Co. <sup>a</sup>	21,625	48.06
Wheeler Ridge-Maricopa WSD	10,815	24.03
<b>Total</b>	<b>45,000</b>	<b>100.00</b>
a. Westside Mutual Water Co. was formed by a landowner that owned land within two KCWA member agencies, for the retirement of a portion of its Table A amounts. The landowner retired 15,335 AF of its Table A amount from Belridge WSD and 6,290 AF of its Table A amount from Lost Hills WD.		

### **3. Operations and Monitoring MOU – October 1995**

The KWBA operates the KWB under the requirements of the *Memorandum of Understanding Regarding Operation and Monitoring of the Kern Water Bank Groundwater Banking Program* (KWB MOU; Appendix B). Negotiation and execution of the KWB MOU was a prerequisite of the KWBA Member Entities’ agreement to retire the 45,000 AF of Table A amounts in exchange for the transfer of the KFE lands from the Department for the Member Entities’ development of a water bank.

#### **a. Impact Mitigation**

The overall objective of the KWB MOU parties (KWBA, its Member Entities, and the districts surrounding the property [Adjoining Entities]) is that the “... design, operation and monitoring of the Project be conducted and coordinated in a manner to insure that the beneficial effects of the Project to the Project Participants [Member Entities] are maximized but that the Project does not result in significant adverse impacts to water levels, water quality or land subsidence within the boundaries of Adjoining Entities.” The adjoining entities include Buena Vista WSD, Rosedale-Rio Bravo WSD, Kern Delta WD, Henry Miller WD, and West Kern WD.

Some of the measures prescribed in the KWB MOU to protect water levels include: 1) spread out recovery area; 2) provide buffer areas between recovery wells and neighboring overlying users; 3) limit the monthly, seasonal, and/or annual recovery rate; 4) provide sufficient recovery wells to allow rotation of use of recovery wells or the use of alternate wells; 5) provide adequate well spacing; 6) adjust pumping rates or terminate pumping to reduce impacts, if necessary; 7) impose time restrictions between recharge and extraction to allow for downward percolation of water to the aquifer; and 8) provide recharge of water that would otherwise not recharge the Kern Fan Basin.

Some of the measures prescribed in the KWB MOU to protect water quality include: 1) giving recharge priority to the best quality water available, 2) removing more salts than are recharged, 3) controlling the migration of poor quality water, and 4) extracting poorer quality groundwater

where practicable (and where blending with excellent quality water from elsewhere in the project results in the water quality objectives of downstream users being met).

In order to ensure that the above goals are met, the MOU provides for the establishment of a Monitoring Committee to oversee banking operations and the results of an extensive monitoring program. The committee is made up of several basin stakeholders including KCWA and all adjoining water districts. This committee has completed a number of tasks required by the MOU, including:

- Preparation of a monitoring plan;
- Specification of monitoring wells;
- Preparation of annual water balance studies and other interpretive studies of sources and uses of water within the project area and within adjoining water districts;
- Determination of the impacts of project operations on surrounding areas; and
- Development of criteria for identifying, verifying, avoiding, eliminating, or mitigating significant adverse impacts from project operations.

#### **b. Loss Factors**

The KWB MOU prescribes loss factors for banking operations. Evapotranspiration losses are assumed to be 6 percent of the gross amount of all water recharged. A study conducted by the KWBA using a methodology developed by the Department and KCWA for the KFE indicates actual losses by evapotranspiration will typically range from 2 percent to 4 percent. The 6 percent loss factor provides assurance that KWB banking operations will not recover more water than that actually recharged.

The KWB MOU provides that an additional 5 percent loss factor will apply to any sales of water to entities outside of Kern County. This additional water provides an overall benefit to the groundwater basin, and cannot be recovered for other uses.

In addition to these losses, 4 percent of the water recharged and stored in the KWB can be purchased by adjoining groundwater districts for overdraft correction purposes.

#### **4. Covenants, Conditions, & Restrictions between KCWA and KWBA – December 1995**

A declaration of covenants, conditions, and restrictions (CC&Rs) on the use of the KFE property was executed by the KWBA for the benefit of the KCWA on December 14, 1995, and subsequently recorded as a covenant running with the property. The CC&Rs provided for several of the provisions of the *Statement of Principles*, including:

- A limitation on consumptive use of groundwater by the KWB project of 0.3 AF/acre;

- Restrictions on the sale, transfer, lease, etc., of parts of the KFE property as long as KCWA has determined that the property can be used economically for groundwater storage and recovery,
- Restrictions on the use of any proceeds from approved KFE property sales, transfers, leases, etc.;
- Remedies for violations of the CC&Rs; and
- Priorities for the use of the KFE property.

The priorities for the use of the KFE property as described in the CC&Rs are as follows: 1<sup>st</sup> priority – KWBA Member Entities; 2<sup>nd</sup> priority – KCWA Basic Contract Member Units; 3<sup>rd</sup> priority – KCWA Non-Basic Contract Member Units; and 4<sup>th</sup> priority – Kern County entities. Any excess capacity beyond that needed for the first four priorities can be used by others under terms and conditions acceptable to KWBA and KCWA.

## **5. Limitations of Exports and Sales**

All transfers from member districts of KCWA require the approval of KCWA. Current KCWA policy places limitations on the sale of banked SWP water. Department approval is required for conveyance of banked SWP water through SWP facilities. CVP contracts place limitations on potential sales of Friant-Kern CVP water. A place-of-use restriction requires the use of banked Friant-Kern groundwater to be within the CVP place of use. Consequently, these agreements and restrictions limit the classification of water that may be transferred to non-Kern County agencies.

### **C. Facilities**

#### **1. Facilities Development Plans**

KWBA's purpose for development of the KWB was to permit the delivery, percolation, and storage of water in aquifers for later extraction, conveyance, and use for the benefit of the project participants.<sup>8</sup> KWBA's construction plans for the KWB included the completion of a Master Plan, the repair and rehabilitation of existing wells under an energy conservation program funded in part by the State of California (SB 583), the expansion of the turnout and channel providing water to the W-4 pond, and the River Area Construction Project, as described in Table 4.

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<sup>8</sup> The Kern Water Bank, Dec. 14, 2004, Appendix A, p. 2

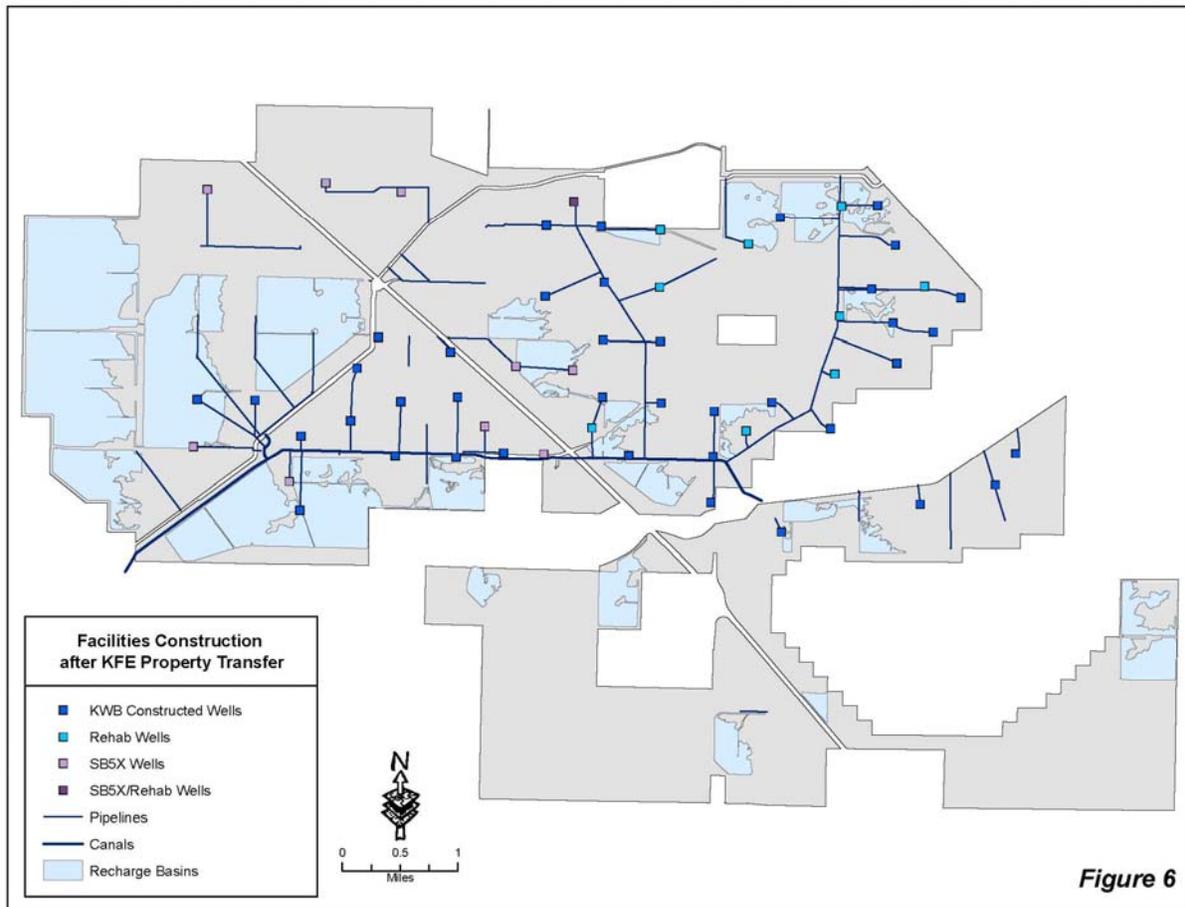
<b>Table 4. KWBA Development Projects</b>		
<b>Project</b>	<b>Years</b>	<b>Activity</b>
KCWA Flood Emergency Program	1995	Construction of 3,034 acres of recharge ponds.
KWBA pond construction	1998-2002	Construction of 4,080 acres of recharge ponds.
Master Plan	1999-2002	Rehabilitation of 10 existing wells, installation of 31 new wells, installation of pipeline to the new wells, and the construction of the Kern Water Bank Canal, that connects the Kern River and the California Aqueduct.
SB 583 Pump Repair and Well Rehabilitation Program	2002-2003	Repair and/or rehabilitation of 10 existing wells pursuant to this program, including the removal of existing well pumping equipment, well-testing, well-casing rehabilitation of some wells, pump repair or replacement, and the reassembly of the wells.
Expansion of the W-4 Pond Turnout and Channel	2003	Enlarged turnout structures and channel to the W-4 pond.
River Area Construction Project	2004	Construction of eight additional recovery wells, pipelines for these eight wells and an additional seven wells, a conveyance pipeline to route the recovered water from these 15 wells to the Kern Water Bank Canal, and a lift station (100 cfs capacity) to convey water for recharge purposes to River Area ponds.
Source: The Kern Water Bank Authority, HCP/NCCP 2003 Annual Report and 2004-2005 Management Plan. May 1, 2004.		

## **2. Facilities Constructed**

Since the transfer of the KFE property, KWBA has constructed recharge ponds, the Kern Water Bank Canal, extraction wells, and pipelines to convey recovered water from operational wells, and has rehabilitated some existing wells (Figure 6).

### **a. Recharge Ponds**

In 1995, under the KCWA flood emergency program (see Section III.B) and prior to the formation of the KWBA, KCWA and the other future participants of the KWBA constructed 3,034 acres of recharge ponds (Figure 3). From 1998 through 2003, KWBA constructed an additional 4,080 acres of recharge ponds, for a total of 7,114 acres. Of this total, 4,699 acres of the recharge ponds constructed are located within the Recharge Sector and 2,415 acres within the Farming Sector. The ponds consist of low earthen levees that pond water to depths of a few feet. This water percolates into the alluvial fan for recharge into the aquifer. Water flows between the ponds in small channels; operators control the flow with small weir boxes.



### b. Recovery Wells

Sixty-five agricultural wells were present on the KFE property when it was acquired by the Department in 1988. At the time the property was transferred to KCWA, 31 of these wells were considered operable, although 3 of these were not connected to any conveyance facilities. The remaining 34 were idle wells in various states of disrepair.

KWBA installed 39 new wells in two phases to accommodate groundwater recovery. The first phase of 31 wells was completed in 2001. Eight additional wells were completed in early 2005. KWBA also rehabilitated ten existing wells and repaired an additional 13 wells. As of December, 2006, a total of 79 wells are operable. All KWB well pumps are electric.

### c. Conveyance Facilities

The KWBA constructed the Kern Water Bank Canal from the Kern River to the California Aqueduct; the canal is approximately 6 miles long and 90 feet wide. Associated structures include headworks at the Kern River, a check structure, a 545 cfs pump station, and diversion facilities at the California Aqueduct. The canal is bi-directional and will receive or deliver about 800 cfs from or to the California Aqueduct or from the Kern River. The western reach of the

canal is at the same elevation as the California Aqueduct; therefore, conveyance of water through the western reach does not require pumping energy. KWBA began construction of the Kern Water Bank Canal in 1999 and completed the canal in October 2000.<sup>9</sup>

The KWBA installed small diameter (15" to 24") PVC pipelines to transport water recovered from extraction wells to existing canals or to large diameter (60") high-density polyethylene pipelines.

#### **D. Land Use**

The KWBA utilizes the lands of the KFE property for various purposes. The KFE property is used primarily as a water recharge and recovery facility. Numerous recharge ponds, wells, conveyance facilities, etc. (see Facilities section above) have been constructed on the property.

In 1997, the KWBA initiated vegetation and restoration programs. The goal of these programs is to protect existing and newly established sensitive habitats for long-term management. Exotic pest plant control is also an important long-term management activity. Annual mowing, livestock grazing (both cattle and sheep), and prescribed burning are all utilized for vegetation management. Limited applications of selective herbicides are used in most years to help control exotic pest plants.

On a limited basis, KWBA has planted various plant species based on the HCP/NCCP. Cottonwoods, willows, and grasses are examples of species planted to enhance percolation within the recharge basins and for wildlife habitat. In retired farm areas that are returning to natural conditions, there is an increase in the number of species and individuals at the KWB, including listed species like Tipton kangaroo rats, and San Joaquin kit foxes.

Under the direction of CDFG, safflower is farmed annually, usually around 70 acres, to enhance dove habitat and to be utilized in an annual dove hunt. In years with sufficient water, there is also a CDFG sponsored waterfowl hunt on designated recharge ponds on the KFE property.

Various oil and gas companies maintain use of parcels on the KFE property to exercise their mineral rights on the property. Since 1996, several oil company-related construction projects have occurred. For example, Chevron Pipeline Company in 1998 removed 44,227 feet of pipeline, of which 27,000 was on the KFE property. Various companies enter the KFE property regularly to conduct maintenance-related surveys of their equipment and to ensure environmental compliance. If environmental issues are observed by the KWBA related to any oil or gas facilities, the representative companies are contacted immediately to ensure proper action.

As part of the monitoring undertaken by the KWBA in compliance with the HCP/NCCP, annual reports are issued summarizing land use by wildlife, any environmental take related to activities on KFE property, and habitat and vegetation restoration efforts. There has been only one occurrence of the take of an endangered species on the KFE property; Tipton kangaroo rats were

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<sup>9</sup> The Kern Water Bank: Infrastructure Development, the Kern Fan Monitoring Committee, and Groundwater Conditions. December 14, 2004

temporarily relocated during the construction of the Kern Water Bank Canal, then placed back in the area alive and well after the construction was complete.

## **1. Mitigation Lands**

The HCP/NCCP establishes permanent mitigation lands on the KWB. These lands include a DWR Mitigation Parcel of 530 acres, and a KWBA Mitigation Parcel of 635 acres (which is part of the Compatible Habitat acreage shown in Table 1). As part of the mitigation effort laid out in the HCP/NCCP, agencies and qualified third parties are allowed to purchase Conservation Credits for projects that may cause temporary or permanent disturbance to lands that includes much of the San Joaquin Valley portions of Kern, Kings, and Tulare counties.<sup>10</sup> For more information on this process, refer to the “Conservation Bank Agreement” included in Volume II of the HCP/NCCP.

## **VI. KWBA’s KWB Operations**

### **A. Overview of Kern County Water Operations**

This section provides an overview of general water operations within Kern County. While these operations are not directly related to the KWBA’s KWB operations, this is intended to provide some background for general water operations within the county, and some context for how KWB operations fit within that.

#### **1. Water Sources**

Kern County residents have historically used surface water primarily from three sources: the Kern River and other local streams, SWP, and CVP. The SWP delivers water from the north via the California Aqueduct. The CVP delivers water from the north via the California Aqueduct and Cross Valley Canal, and from the central Sierra via the Friant-Kern Canal. The Kern River system and other local streams drain the southern Sierra. Local conveyance facilities, including the Kern Water Bank Canal, Cross Valley Canal, and Pioneer Canal, can be used convey water from these primary sources to various parts of the KFE property.

##### **a. Kern River and Other Local Streams**

The Kern River has historically been a primary source of surface water to Kern County. North Kern WSD, Kern Delta WD, Buena Vista WSD, KCWA, and the City of Bakersfield are the major holders of Kern River surface water rights.

In most years, water users divert all Kern River flow downstream from its entrance to the valley, northeast of Bakersfield, and as a result the river channel through the KFE property is typically

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<sup>10</sup> More information on this process is contained in the “Conservation Bank Agreement” included in Volume II of the HCP/NCCP, on file with the Department.

dry. However, in extremely wet years, the Kern River Intertie diverts Kern River flows into the California Aqueduct to prevent downstream flooding. Since 1978, over 1,000,000 AF of Kern River water has flowed through the Kern River-California Aqueduct Intertie. During the same period, an additional 430,000 AF of Kern River water bypassed the Intertie via the Kern River flood channel. These flood flows have exceeded the available capacity of recharge facilities in Kern County since KCWA constructed the Intertie in 1977.

In very wet years the significant quantities of flood waters that otherwise would be diverted into the Intertie are available for recharge in the KFE area. At other times, other pre-1914 appropriative water right holders can provide Kern River water for recharge in the KWB. Although these right holders are not partners in the KWB, KWBA participants may purchase Kern River water from them for storage in the KWB.

Water users can divert the flows of the Kaweah, Tule, and Kings Rivers stream groups on the east side of the San Joaquin Valley and convey the water via the Friant-Kern Canal to its terminus. From the terminus, water users can release the water into the Kern River channel or through various connections into the Cross Valley Canal. As with Kern River water, pre-1914 appropriative water right holders can provide Kaweah, Tule, and Kings Rivers water for recharge in the KWB. Although these right holders are not partners in the KWB, KWBA participants may purchase water from them for storage in the KWB.

#### **b. SWP**

The SWP is a large source of non-local water for Kern County. KCWA has a SWP Table A amount of 998,730 AF. Thirteen Kern County member agencies contract for this water from KCWA, and KCWA has retained a portion for itself and its Improvement District No. 4 (Table 5). Dudley Ridge WD, an SWP contractor located in Kings County, currently has a SWP Table A amount of 57,343 AF.

KCWA and Dudley Ridge WD can recharge SWP Table A and Article 21 water when they have SWP water in excess of their immediate in-district demands. They can also transfer or exchange water with other agencies to increase or reduce their water supplies in a year, or participate in arrangements that change the year of water deliveries.

<b>Table 5. KCWA Member Units That Hold Contracts With KCWA to Receive SWP Table A Water</b>	
<b>Agency</b>	<b>Contractual Table A Amount (AF)</b>
Belridge WSD	121,508
Berrenda Mesa WD	108,600
Buena Vista WSD	21,300
Cawelo WD	38,200
Henry Miller WD	35,500
KCWA	8,000
Kern Delta WD	25,500
Lost Hills WD	119,110
Improvement District No. 4	82,946
Rosedale-Rio Bravo WSD	29,900
Semitropic WSD	155,000
Tehachapi-Cummings County WD	19,300
Tejon-Castac WD	5,278
West Kern WD	31,500
Wheeler Ridge-Maricopa WSD	197,088
<b>Total</b>	<b>998,730</b>
Source: KCWA, 2006.	

**c. CVP**

CVP contractors in Kern County may receive water via the Friant-Kern Canal or the Cross Valley Canal, either directly or by exchange or transfer according to contract provisions with Reclamation.<sup>11</sup> Arvin-Edison WSD, Delano-Earlimart ID, Shafter-Wasco ID, and Southern San Joaquin MUD have Friant Division long-term contracts with USBR.

Reclamation’s contracts with Friant-Kern contractors include a two-class system of water allocation. Municipal and industrial (M&I) and agricultural water users who have limited access to good-quality groundwater have Class 1 contracts, which are based on a firm water supply. Reclamation delivers the Friant-Kern’s first 800 TAF of annual water supply under Class 1 contracts.<sup>12</sup> Class 2 water is a supplemental supply; Reclamation delivers Class 2 water directly for agricultural use or for groundwater recharge, and these are areas that generally experience groundwater overdraft.

In addition to Class 1 and Class 2 water deliveries, Reclamation delivers water that would otherwise be released for flood control purposes. Section 215 of the Reclamation Reform Act of 1982 authorizes the delivery of unstorable irrigation water that would be released in accordance with flood control criteria or unmanaged flood flows. Reclamation’s delivery of Section 215

<sup>11</sup> While CVP water can be delivered to the KWB through the Cross Valley Canal, such deliveries are not considered further in this study because, to date, no excess water has been made available for KWB recharge from this source.

<sup>12</sup> USBR and DWR, 2003, Upper San Joaquin River Basin Storage Investigation, Phase 1 Investigation Report

water has enabled contractors to recharge more water for groundwater replenishment than could otherwise be supported with only Class 1 and Class 2 contract deliveries.

In addition to the Class 1, Class 2, and conjunctive management aspects of Friant Division operations, some districts often arrange annual water transfers with other districts. These transfers provide opportunities to improve water management within the Friant service area. In wet years, districts that have water surplus to their needs can transfer water to other districts with the ability to recharge groundwater. Conversely, in dry years, districts that store water can return water to districts with little or no groundwater supply; these arrangements provide an informal groundwater banking program within the Friant Division.

KWBA participants do not have long term contracts for CVP water, but have purchased Section 215 and other flood waters from the CVP system through temporary contracts with Reclamation.

## **2. Water Management Exchanges and Landowner Transfers**

Water transfers and exchanges have historically been and continue to be a regular part of water management in the San Joaquin Valley. Transfers are one-way transactions, where water from one agency is transferred to another, with no future return of that water. For KCWA, transfers with another agency are typically “landowner transfers,” where a landowner that owns land within both KCWA and another agency’s service area wants to transfer the water available to it from one agency for use on its land in the other agency’s service area. Exchanges are two-way transactions, where water from one agency or source is delivered to another agency, in exchange for the return of a specified quantity of water. An exchange may involve a change in the timing of delivery of water (e.g., water from one agency is delivered to another, in exchange for water from the other agency delivered later that year or in a following year), or a change in the source of water delivered (e.g., water from a source available to one agency is delivered to another, in exchange for water from a different source). These transactions can provide a number of benefits, including improved water management, reduced costs for water delivery, and/or improved water quality.

## **3. Water Sales**

Table 6 gives an account of water sales by KCWA member agencies and other entities within Kern County to the Environmental Water Account (EWA) in the years 2000 and 2001. The table gives the SWP water exchange total for both 2000 and 2001, lists the seller and their amount (in AF), the type of water banked, which facility or agency banked the water, and the date the water was released to the EWA. These sales are representative examples of the types of water sales that occur from Kern County groundwater banks.

<b>Table 6. Sales by Kern County Entities to the Environmental Water Account in 2000 and 2001</b>				
<b>Seller</b>	<b>Amount (AF)</b>	<b>Banked Groundwater Type</b>	<b>Groundwater Banking Facility or Agency</b>	<b>Date Water Released to EWA</b>
2000 SWP Table A Allocation Exchange Water Purchased and Delivered in 2000				
Kern Water Bank Participants	31,555	Friant-Kern Flood	KWB	7/00
Kern Water Bank Participants	40,725	Kern River Flood	KWB	8/00
2000 SWP Carryover Table A Allocation Exchange Water Purchased and Delivered in 2001				
Arvin-Edison	10,000	Friant-Kern Flood	Arvin-Edison WSD	3/01
Rosedale Rio Bravo	19,036	Friant-Kern Flood	Rosedale Rio Bravo WSD	3/01
Westside Mutual Water Co.	15,000	SWP Table A Allocation	KWB	3/01
<b>2000 SWP Exchange Subtotal</b>			<b>116,316</b>	
2000 SWP Table A Allocation Exchange Water Purchased and Delivered in 2001				
KCWA for Nickel Family LLC <sup>1</sup>	10,000	Kern River Flood	Pioneer Project	5/01
KCWA/ID 4	10,000	Kern River Flood	KWB	6/01
Buena Vista/ Rosedale/ West Kern	20,218	SWP Table A Allocation	Buena Vista WSD	5/01
Buena Vista/ Rosedale/ West Kern	1,000	SWP Table A Allocation	Buena Vista WSD	5/01
Buena Vista/ Rosedale/ West Kern	2,500	SWP Table A Allocation	Buena Vista WSD	7/01
Semitropic WSD	10,767	SWP Table A Allocation	KWB	10/01
Semitropic/ Tulare ID	4,233	Friant-Kern <sup>2</sup>	Semitropic WSD	11/01
Westside Mutual/Tejon Castaic	21,000	SWP Table A Allocation	KWB	10/01
Cawelo WD	5,000	SWP Table A Allocation	KWB <sup>3</sup>	11/01
<b>2001 SWP Exchange Subtotal</b>			<b>84,718</b>	
<b>2000 &amp; 2001 Total</b>			<b>201,034</b>	

<sup>1</sup>The Nickel Family LLC is a private company primarily invested in farming. Nickel was the owner of a pre-1914 Kern River Water Right, referred to as the Lower River Water Rights. KCWA recently purchased the Lower River Rights from Nickel, and as part of the deal, Nickel is supplied with 10,000 AF of water per year by KCWA. Nickel banks this water in KCWA's portion of the Pioneer Project.

<sup>2</sup>Tulare ID delivered non-CVP water to Semitropic WSD via a Friant-Kern exchange.

<sup>3</sup>Westside Mutual pumped its KWB account in exchange for a like amount of Cawelo's 2800-acre account that was assigned to Belridge on behalf of Westside Mutual.

Source: KCWA 2002

In addition to these types of sales, 4 percent of the water recharged and stored at the KWB can be purchased by adjoining groundwater districts within Kern County for overdraft correction purposes.

## B. KWB Banking Operations

### 1. Recharge Operations

From 1995 through 2005, KWBA delivered approximately 1.3 million AF of water for recharge. Most of this recharge occurred during 1995-1998 and 2005 (see Figure 7). As would be expected, the volumes of water available for recharge are dependant upon California's annual water conditions. Table 7 shows the annual variability of statewide precipitation, Tulare Lake regional precipitation, SWP allocations, and CVP allocations.

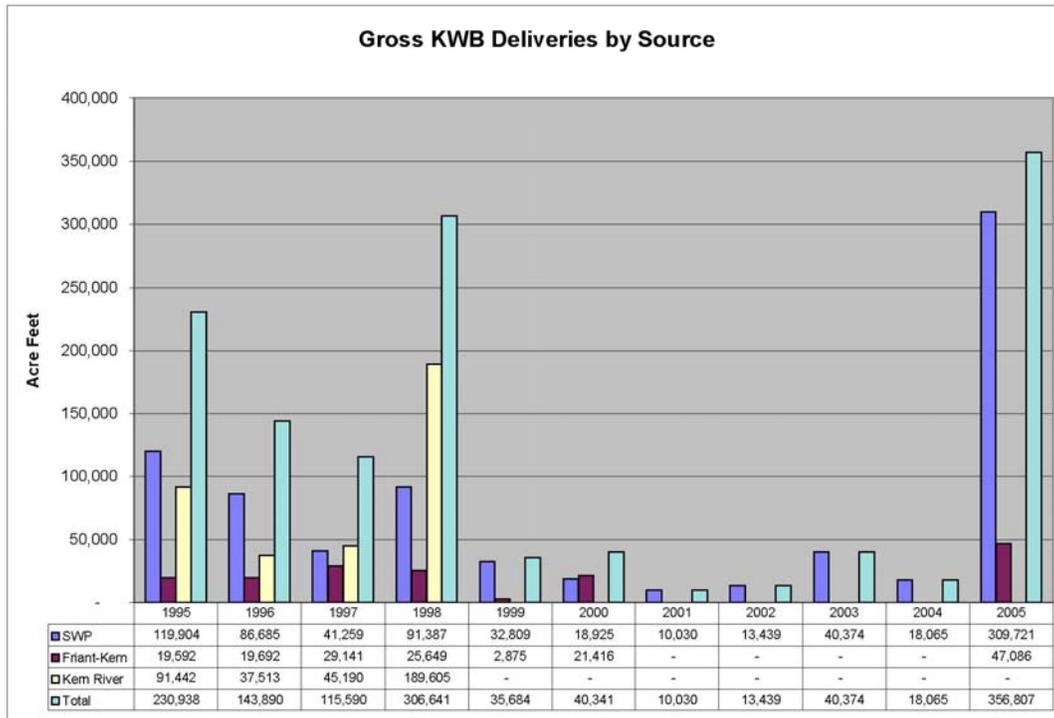


Figure 7

<b>Year</b>	<b>State-wide Precipitation (% of average)</b>	<b>Tulare Lake Hydrolog. Region Precipitation (% of average)</b>	<b>SWP Allocation (% of Table A request)</b>	<b>CVP Friant-Kern Allocation (Class 1/ Class 2)</b>	<b>Kern River Flows<sup>13</sup> (AF)</b>
1995	165	165	100	100/100	1,240,895
1996	115	105	100	100/58	953,127
1997	125	130	100	100/60	1,160,099
1998	170	190	100	100/10	1,533,906
1999	95	80	100	100/20	410,403
2000	100	95	90	100/17	465,213
2001	75	60	39	100/5	495,616
2002	75	80	70	100/8	350,547
2003			90	100/5	457,176
2004			65	100/8	421,423

Table 8 provides a summary of gross deliveries for recharge by source, as of December 31, 2005. Sixty percent of the deliveries were SWP water, 27 percent were Kern River water, and 13 percent were Friant-Kern water.

<b>SWP (AF)</b>	<b>Friant - Kern (AF)</b>	<b>Kern River (AF)</b>	<b>Total (AF)</b>
782,598	165,451	363,750	1,311,799
60%	13%	27%	na

Water delivered to recharge ponds is subject to losses by evapotranspiration. As prescribed in the KWB MOU, 6 percent evapotranspiration losses are deducted from all gross deliveries to KWB recharge ponds to determine the net amount of these deliveries that is recharged and stored. Annual gross deliveries for recharge and net recharge after losses are shown in Table 9, rows 1 and 2. Other changes to storage accounts, including miscellaneous acquisitions of stored water and exchanges between KWB participants, are shown in rows 3 and 4.

## **2. Recovery Operations**

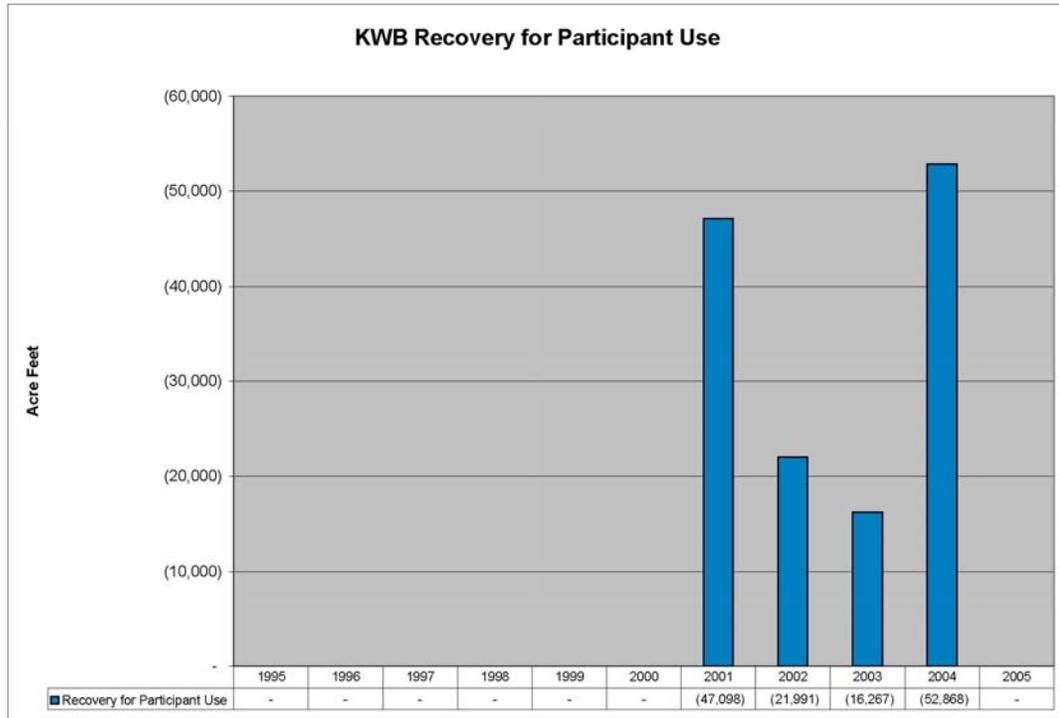
Water stored in the KWB has been recovered by the KWB participants either for their direct use or for sale to others. From 1995 through 2005, recovery for participant use totaled 138,224 AF. All of this water was recovered during the dry years from 2001 through 2004 (see Figure 8). During this same 1995 through 2005 period, water sales totaled 423,320 AF. About three quarters of these sales were to the EWA, with the remaining sales to:

- agricultural entities within the San Joaquin Valley,
- a wildlife refuge,

<sup>13</sup> Kern River downstream of Lake Isabella (Source: CDEC)

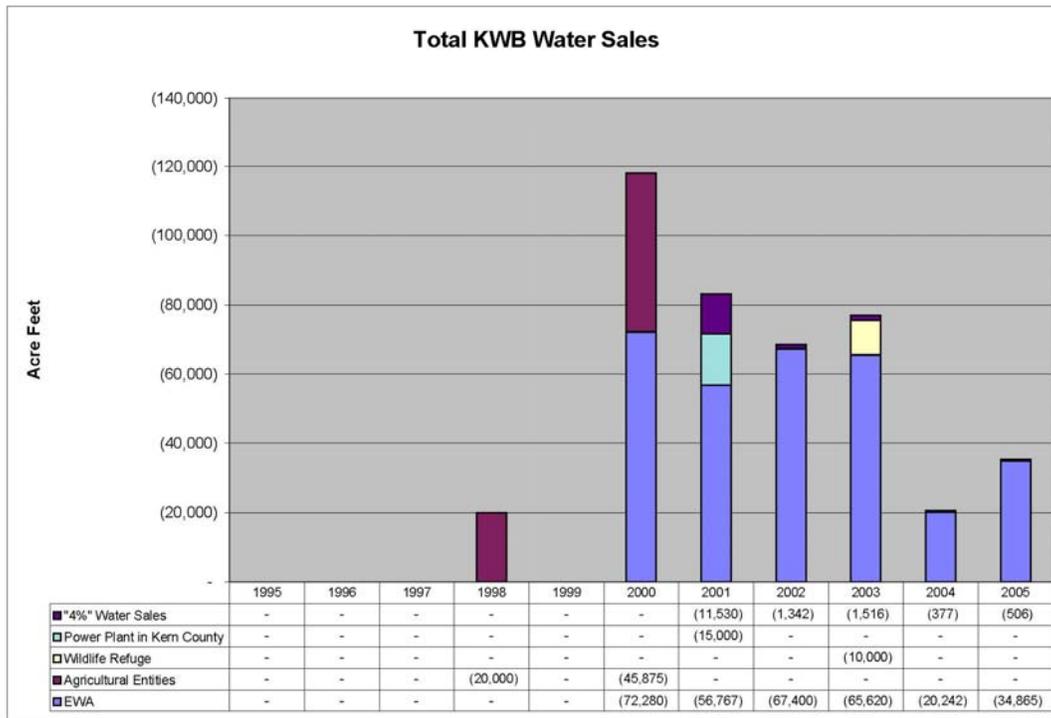
- a power plant located within Kern County,
- and the “4%” water made available to adjoining water districts for overdraft correction pursuant to the KWB MOU (see Figure 9).

All of these sales occurred in 1998 and 2000 through 2005.



Data from Table 9, row 8. Includes Recovery by Pumping for Participant Use and Recovery by Exchange for Participant Use. See Figure 9 for further explanation for Recovery by Exchange for Participant Use.

Figure 8



Data from Table 9, rows 14 through 18. Includes Recovery by Exchange for Water Sales. See Figure 11 for further explanation of Recovery by Exchange for Water Sales.

Figure 9

Water stored in the KWB can be recovered by one of two mechanisms, 1) recovery by pumping or, 2) recovery by exchange. Recovery by pumping entails the physical pumping of water from the aquifer using the KWB's groundwater wells. This type of recovery occurred in the dry years of 2001 through 2004. From 1995 through 2005, a total of 204,639 AF was recovered by pumping. Of this total, 132,099 AF was recovered for participant use and 72,540 AF for water sale (see Table 9, rows 6 and 9).

Stored water can also be recovered by exchange. For example, West Kern WD, which operates a separate banking project adjacent to the KWB, may need to recharge water at times when KWB participants need to recover water. Rather than recharge and recover water at the same time in adjacent projects, West Kern WD's surface water is made available for KWB participant use, and a like amount of KWB stored water is shifted in the groundwater storage accounts from the KWB to West Kern WD. Such exchanges may also occur between KWB participants. These exchanges reduce energy consumption and costs to both parties. From 1995 through 2005, a total of 326,634 AF was recovered by exchange. Of this total, 6,125 AF was recovered for participant use and 320,509 AF for water sales (see Table 9, rows 7 and 10).

### **3. Water Exchanges**

Operational exchanges may be used to increase the efficiency of both recharge and recovery operations. These exchanges can occur at two levels. The first would be a local exchange within Kern County coordinated entirely by KCWA. For example, one of the KWB participants might have Kern River water available to it at the same time that a participant in one of the adjacent Kern Fan banking projects has SWP water available to it. In this situation, the SWP water would be delivered to western banking facilities (e.g., the KWB) to reduce energy consumption costs, and the Kern River water would be delivered to eastern banking facilities (e.g., the Berrenda Mesa Project). However, the water recharged at the KWB would be accounted for as Kern River water, as if the exchange did not occur.

The second level of exchange that can occur uses facilities outside of Kern County, and typically requires the approval of the Department and/or Reclamation. For example, one of the KWBA participants might exchange its SWP Table A water for a like amount of CVP water available to a CVP contractor, such as Westlands Water District (WWD). In this situation, the Department would deliver the SWP Table A water to WWD via Reach 7 of the California Aqueduct in Kings County for use within the SWP service area, and Reclamation would deliver a like amount of CVP water to KCWA via the Friant-Kern Canal for recharge in Kern County banking facilities. As in the case of the local exchange described above, the water would be accounted for as if the exchange did not occur, or in this example, as SWP water.

### **4. Storage Accounting**

The KCWA oversees all water transactions in Kern County and provides important water accounting for the banking projects in the Kern Fan area. An accounting of KWB storage activities from 1995 through 2005 is shown in Table 9. The table shows:

- Additions to Storage
  - Gross deliveries for recharge
  - Net amount recharged, after 6 percent evapotranspiration losses
  - Acquisitions (e.g., the portion of the Hacienda Program water transferred to KCWA as part of the KFE property transfer)
  - Exchanges between KWB participants
- Recovery for Participant Use
  - Recovered by pumping
  - Recovered by exchange (see Figure 10 for an explanation of the accounting for this type of exchange)
- Water Sales
  - Categorized by method of recovery
    - Recovered by pumping

- Recovered by exchange (see Figure 11 for an explanation of the accounting for this type of exchange)
- Placed in trust (15,000 AF of stored water placed in trust for use by a power plant located within the service area of KWBA participant Wheeler Ridge-Maricopa WSD)
- “4%” water sales (4 percent of stored water made available for purchase by water districts adjoining the KWB, for overdraft correction pursuant to the KWB MOU)
- o Categorized by use
  - EWA
  - Agricultural entities in San Joaquin Valley
  - Wildlife refuge
  - Power plant located in Kern County (15,000 AF of stored water placed in trust)
  - “4%” water sales
- o Losses for water sales (5 percent losses are applied to all sales of water leaving Kern County, for the overall benefit of the groundwater basin pursuant to the KWB MOU)
- o Total storage reduction for sales (recovery by pumping for water sale, plus water placed in trust, plus “4%” water sales, plus losses for water sales)

The KWB storage balance is the net of additions to storage, minus recovery for participant use and total reductions for sales. These KWB activities and total storage balances are shown on an annual and cumulative basis in Figures 12 and 13, respectively. As of December 31, 2005, the KWB participants had a total cumulative balance of 1,050,778 AF of water stored in the KWB.

### Recovery by Exchange for Participant Use

Recovery by exchange for participant use is used to deliver water at times when a KWB participant wishes to recover water from the KWB at the same time an adjoining entity with a groundwater banking program has SWP water available in the California Aqueduct that it would have otherwise recharged. The exchange allows the delivery to occur without incurring energy costs or wear and tear on equipment. In the example below, 1,000 AF of water from an adjoining entity is physically delivered to the KWB participant's turn-outs. The 1,000 AF of water is deducted from the KWB participant's previously recharged supply and the adjoining entity's groundwater account is credited with 1,000 AF of water.

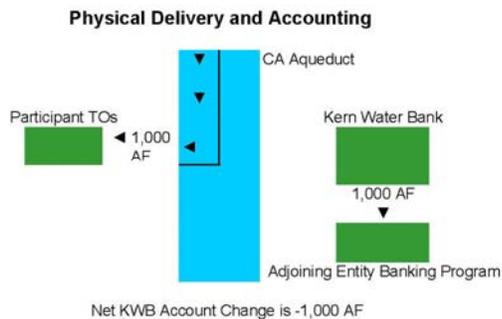


Figure 10

### Recovery by Exchange for Water Sale

Recovery by exchange for water sale is used to deliver water at times when a KWB participant wishes to recover an exportable water supply from the KWB for sale to another entity, at the same time it has SWP water available in the California Aqueduct that it would have otherwise recharged. The exchange allows the delivery to occur without incurring energy costs or wear and tear on equipment. In the example below, 1,000 AF of water is physically delivered to the EWA in San Luis Reservoir. The KWB MOU prescribes a 5% loss to the groundwater basin for sales leaving Kern County. Therefore, in this example, a 5% loss of 50 AF is applied. For accounting purposes: 1,000 AF of water is deducted from the KWB Participant's previously recharged exportable supply for "delivery" to San Luis Reservoir, 50 AF is deducted from the KWB Participant's account for the 5% loss factor, and 1,000 AF is added to the KWB Participants account as stored SWP water. In Table 9, the amount exchanged is shown as Recovery by Exchange for Water Sale (row 10), and for sales of water leaving Kern County, the 5% reduction for losses is shown as Losses for Sales (row 20).

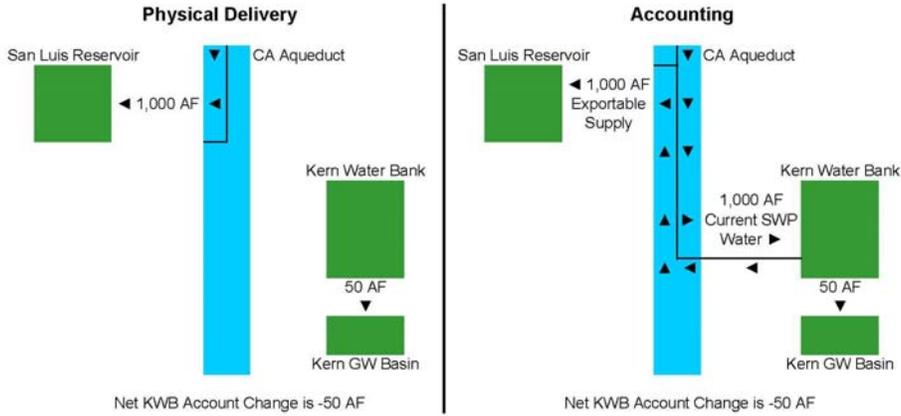
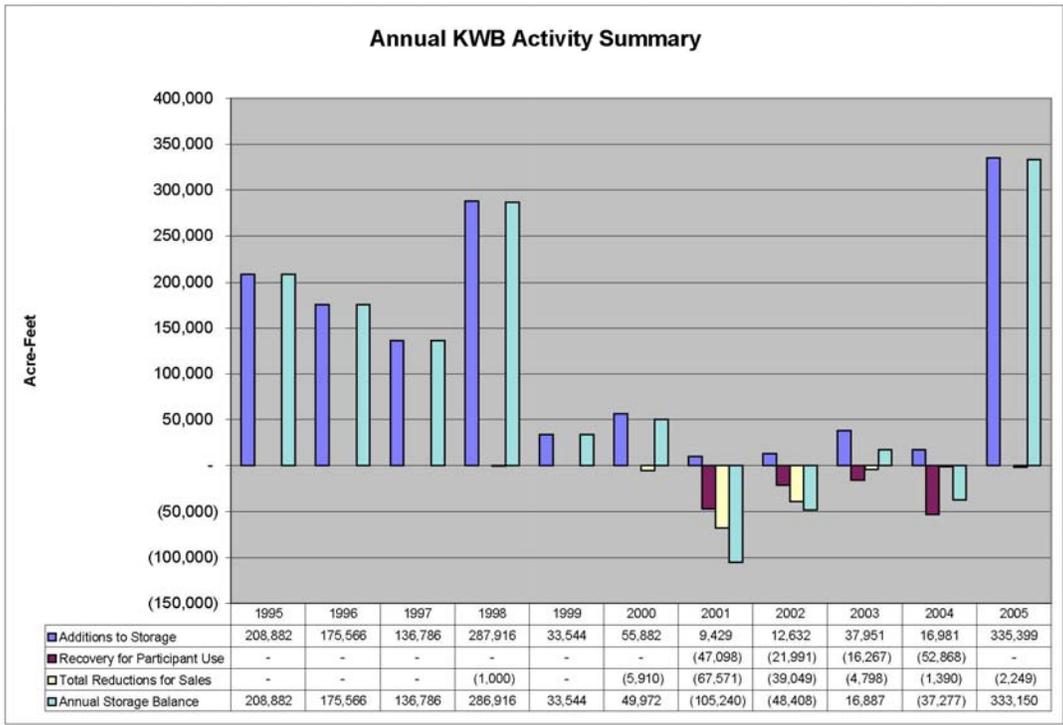


Figure 11



Data from Table 9, row 5, 8, 21, and 22.

Figure 12

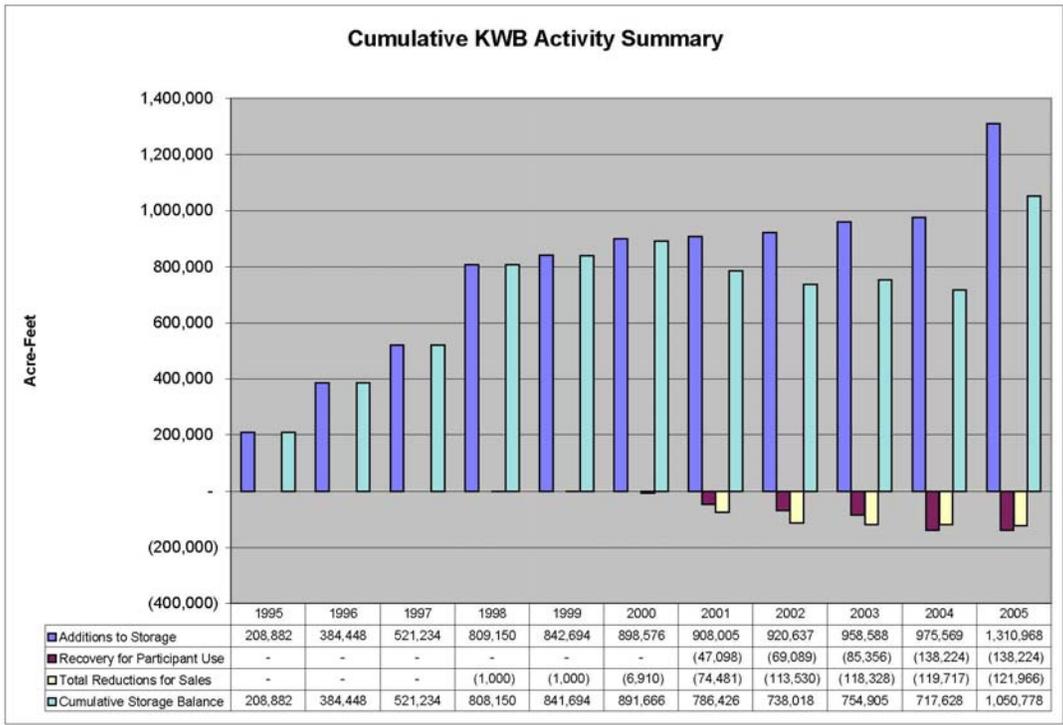


Figure 13

**Table 9.**  
**KWB Account Summary**

	Row	Formula	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004 <sub>a</sub>	2005 <sub>a</sub>	Totals
<b>Additions to Storage</b>														
Recharge														
Gross Deliveries	1		230,938	143,890	115,590	306,641	35,684	40,341	10,030	13,439	40,374	18,065	356,807	1,311,799
Net Recharge (after 6% losses) <sub>1</sub>	2	row 1 x .94	217,082	135,256	108,654	288,243	33,544	37,920	9,429	12,632	37,951	16,981	335,399	1,233,091
Acquisitions	3		-	49,518	28,359	-	-	-	-	-	-	-	-	77,877
Exchanges Between Participants <sub>2</sub>	4		(8,200)	(9,208)	(227)	(327)	-	17,962	-	-	-	-	-	-
Total Additions to Storage	5	rows 2 + 3 + 4	208,882	175,566	136,786	287,916	33,544	55,882	9,429	12,632	37,951	16,981	335,399	1,310,968
<b>Recovery for Participant Use</b>														
Recovery By Pumping for Participant Use <sub>3</sub>	6		-	-	-	-	-	-	(47,098)	(21,991)	(16,267)	(46,743)	-	(132,099)
Recovery By Exchange for Participant Use <sub>4</sub>	7		-	-	-	-	-	-	-	-	-	(6,125)	-	(6,125)
Total Recovery for Participant Use	8	rows 6 + 7	-	-	-	-	-	-	(47,098)	(21,991)	(16,267)	(52,868)	-	(138,224)
<b>Water Sales</b>														
Sales by Method														
Recovery By Pumping for Water Sales <sub>3</sub>	9		-	-	-	-	-	-	(38,203)	(34,337)	-	-	-	(72,540)
Recovery By Exchange for Water Sale <sub>4</sub>	10		-	-	-	(20,000)	-	(118,155)	(18,564)	(33,063)	(75,620)	(20,242)	(34,865)	(320,509)
Trust Accounts <sub>5</sub>	11		-	-	-	-	-	-	(15,000)	-	-	-	-	(15,000)
"4%" Water Sales <sub>6</sub>	12		-	-	-	-	-	-	(11,530)	(1,342)	(1,516)	(377)	(506)	(15,271)
Total Sales	13	sum rows 9 - 12	-	-	-	(20,000)	-	(118,155)	(83,297)	(68,742)	(77,136)	(20,619)	(35,371)	(423,320)
Sales by Use														
EWA	14		-	-	-	-	-	(72,280)	(56,767)	(67,400)	(65,620)	(20,242)	(34,865)	(317,174)
Agricultural Entities	15		-	-	-	(20,000)	-	(45,875)	-	-	-	-	-	(65,875)
Wildlife Refuge	16		-	-	-	-	-	-	-	-	(10,000)	-	-	(10,000)
Power Plant in Kern County <sub>5</sub>	17		-	-	-	-	-	-	(15,000)	-	-	-	-	(15,000)
"4%" Water Sales <sub>6</sub>	18		-	-	-	-	-	-	(11,530)	(1,342)	(1,516)	(377)	(506)	(15,271)
Total Sales	19	sum rows 14 - 18	-	-	-	(20,000)	-	(118,155)	(83,297)	(68,742)	(77,136)	(20,619)	(35,371)	(423,320)
Losses for Sales <sub>7</sub>	20	out-of-co sales x .05	-	-	-	(1,000)	-	(5,910)	(2,838)	(3,370)	(3,282)	(1,013)	(1,743)	(19,156)
Total KWB Storage Reduction for Sales <sub>8</sub>	21	rows 9 + 11 + 12 + 20	-	-	-	(1,000)	-	(5,910)	(67,571)	(39,049)	(4,798)	(1,390)	(2,249)	(121,966)
<b>KWB Storage Balance</b>														
Annual Storage Balance	22	rows 5 + 8 + 21	208,882	175,566	136,786	286,916	33,544	49,972	(105,240)	(48,408)	16,887	(37,277)	333,150	1,050,778
Cumulative Storage Balance	23	row 23 <sub>a</sub> + row 22 <sub>1</sub>	208,882	384,448	521,234	808,150	841,694	891,666	786,426	738,018	754,905	717,628	1,050,778	

1 Net Recharge is the amount of Gross Deliveries stored after deducting 6% for evapotranspiration losses. 2 Exchanges between KWB participants using existing KWB storage accounts. Note that there is no net change to KWB storage resulting from these exchanges. 3 Recovery By Pumping is stored water recovered by physically pumping it from wells. 4 Recovery By Exchange is stored water recovered by exchange with surface water available at the same time. See Figures 9 and 11 for further explanation. 5 Stored water placed in Trust for use by a power plant located within the service area of KCWA member agency Wheeler Ridge-Maricopa WSD. 6 "4%" Water Sales is 4% of stored water made available for purchase by water districts adjoining the KWB for overdraft correction, pursuant to the KWB MOU. 7 Losses for Sales are losses of 5% applied to all sales of water leaving Kern County, pursuant to the KWB MOU. 8 9 Data for 2004 and 2005 are preliminary and subject to minor revision. Total KWB Storage Reduction for Sales is Recovery By Pumping for Water Sale + Trust Account + "4%" Water Sales + Losses for Sales. Recovery By Exchange for Water Sale is not included in this total because it is an exchange with surface water supplies and so does not result in physical storage reductions (see Figure 11 for further explanation).

## **5. Operations Monitoring**

As discussed in Section V.B.3, the KWB is operated under the requirements of the *Memorandum of Understanding Regarding Operation and Monitoring of the Kern Water Bank Groundwater Banking Program*, which provides for the establishment of an extensive monitoring program and a Monitoring Committee to oversee banking operations and the results of said monitoring. The committee is made up of several basin stakeholders including the KCWA and all adjoining water districts.

### **a. Groundwater Monitoring**

KWBA has used extensive monitoring to establish baseline groundwater quality and ensure that groundwater problems are not developing. This monitoring consists of two elements: 1) the regular sampling of 50 dedicated monitoring wells for several potential constituents of concern, and 2) the sampling of all recovery wells according to a Monitoring Schedule developed by the Department of Health Services.

The sampling of the monitoring wells is mandated by the KWB MOU. Under this program, water levels are measured at least semiannually, and water samples are analyzed for several potential constituents of concern at least annually. The results of this monitoring are reported to and reviewed by the Monitoring Committee to ensure that excellent groundwater quality is maintained.

The second element of groundwater monitoring includes sampling the recovery wells according to a DHS Title 22 Monitoring Schedule for wells providing water to municipal purveyors (KCWA, 1997). In addition to providing extensive information regarding groundwater quality, the results of this sampling are used to model expected changes in water quality in conveyance facilities receiving the recovered water.

### **b. Mitigation**

A primary purpose of the Monitoring Committee is to evaluate groundwater information and determine if adverse impacts are likely to occur as a result of project operations. If the Monitoring Committee determines that adverse impacts are likely, then mitigation strategies are developed, as discussed in more detail in Section V.B.3. No mitigation measures have been necessary to date.

## **C. Maintenance and Other Operations**

### **1. Water Operations Facilities Management**

The KWB HCP allows the KWBA to install, construct, repair, maintain, and operate water recharge, water recovery, and water conveyance facilities within the Recharge Basin Sector and

the Other Water Banking Facilities Sector of the KWB. The management of these facilities is described in Annual Management Plans submitted to the wildlife agencies. These plans ensure that management activities comply with the HCP's Vegetation Management Plan, the Minimization of Impacts Requirements, and other measures prescribed by the HCP (see Section V.A.2.b.).

Typical activities include grazing, burning, and mowing in conformance with the Vegetation Management Plan, the application of herbicides with hand sprayers at wells and gate structures, road grading, and fence repair.

## **2. Land Maintenance**

The primary tool for managing the habitat and fauna of the Kern Water Bank is the HCP's Vegetation Management Plan, with the primary goal being the minimization of tumbleweed and other noxious non-native plant growth (primarily salt cedar). This in turn encourages native plant growth and the continued conversion of water bank lands into exceptional upland, riparian, and alkali flat habitats. The tools provided in the Vegetation Management Plan include burning, grazing, disking, mowing, and herbicide application. From 1996 through 1999, tumbleweeds were primarily controlled with burning. In 2003, tumbleweeds were primarily controlled with cattle and sheep grazing programs. Other management programs include burning in ditches and chopping old tumbleweed drifts. Chopping removes the dense cover of the drifts and allows for the reestablishment of grasses and forbs which compete with the tumbleweeds. Salt cedar is controlled with herbicide spraying at various locations on an as-needed basis.

## **3. Habitat Restoration and Enhancement**

The creation of the KWB is resulting in the reestablishment and preservation of exceptional wetland and upland habitat that existed historically throughout much of the southwestern San Joaquin Valley. About 17,000 of the 20,000 acres that comprise the KFE property were farmed intensively prior to 1991. Now, the water conservation activities of the KWB are re-creating intermittent wetland habitat. Willows, cottonwoods, sedges, and other wetland vegetation are reemerging, and the recharge basins and basin edges are providing nesting and foraging habitat for waterfowl and other birds. To date, more than 40 species of waterfowl have been sighted on the KFE property, including Caspian terns, the white-faced ibis, double-crested cormorants, and white pelicans.

Recharge activities only occur on about one third of the KFE property; upland habitat is becoming reestablished on the remaining two thirds of the property. Vegetation management in these areas is focusing on regenerating native grasses and plants that help to promote the threatened and endangered species associated with this area. This upland habitat is supporting large populations of raptors, kangaroo rats, rabbits, badgers, bobcats, and coyotes. Of particular importance are the populations of Tipton kangaroo rats, burrowing owls, and tri-colored blackbirds.

#### **4. Clean-up of Areas of Environmental Concern**

A *Preliminary Environmental Assessment* report prepared by Luft Environmental Consultants in October 1995 identified “Areas of Potential Environmental Concern” (APECs) on the KFE property. All of the APECs which are KWBA’s responsibility have been cleaned up, remediated and/or closed. These include:

- *Buena Vista Ranch Headquarters and the HSST Ranch Headquarters:* The pesticides in soil identified at the Buena Vista Ranch Headquarters and the HSST Ranch Headquarters, each an APEC, were remediated by the Kern Water Bank Authority. The scope of the clean-up involved excavating contaminated soil and treating it in a thermal-desorption unit. The Department of Toxic Substances Control certified that the remedial activities were complete in 2001 and that the land could be used for all uses, including the “intended purpose of maintaining a groundwater resource bank.”
- *S&M Farms, Tumbleweed Farms, Red Dirt, Two Tanks:* No significant environmental issues were identified at these sites. The trash at S&M farms and the two tanks have been removed.
- *Underground Storage Tanks:* The Kern Water Bank Authority has also removed two underground storage tanks (USTs) not identified in previous environmental reports. The USTs were uncovered at the Buena Vista Ranch Headquarters on April 30, 1999, and removed May 7, 1999 under a Kern County Environmental Health Services Department permit. No soil contamination was detected beneath the USTs, and the county has indicated the tank closure is complete with no further action necessary.

The balance of the APECs identified in the Luft Report are not the responsibility of KWBA. However, KWBA is tracking these issues and coordinating with the appropriate regulatory agency where appropriate. For example, KWBA has been discussing potential impacts at the former Uhler Fire Training Facility with both Kern County and the Regional Water Quality Control Board. (All of the facilities at this site have been removed, and Kern County is in the process of developing a bid to have soil and groundwater at the site assessed). KWBA is also actively tracking assessment and clean-up activities associated with the former Wait-Midway Pipeline and the Strand Oil Field.

#### **D. HCP/NCCP Mitigation and Monitoring**

The HCP/NCCP requires the KWBA to be responsible for establishing, maintaining, and enhancing habitat preserves, carrying out site-specific mitigation measures and for monitoring and reporting the results of management activities to the USFWS and CDFG in Annual Reports. KWBA compiles the annual report with input from professional biologists and botanists.

## **1. Monitoring Compliance**

From 1999 through 2005, with the assistance of wildlife biologists and the cooperation of the USFWS and CDFG, KWBA staff have spent many hours in the field observing, photographing, trapping, and enumerating wildlife to document any instances of “take”, either through construction activities or KWB operations. These monitoring activities are, in part, prescribed in the HCP. For example, populations of the San Joaquin Kit fox are surveyed with a nighttime spotlighting program, and Tipton Kangaroo rat populations are surveyed with trapping grids. Other surveys are conducted voluntarily (e.g., waterfowl and tumbleweeds). The only instance of “take” ever reported was the temporary relocation of live Tipton kangaroo rats during the construction of the Kern Water Bank Canal headworks. The kangaroo rats were successfully reintroduced to the area after construction was completed.

## **2. Mitigation Measures**

The HCP prescribes various mitigation measures for construction and repair activities (see Section V.A.2.b.). According to the KWB’s annual reports, these measures were adhered to as required.

## **VII. Alternatives for Recharge at KWB**

The following analysis was prepared to determine how much of the SWP water that was recharged in the KWB from 1995 through 2004 could have been recharged in other existing recharge projects in Kern County, assuming no access was available to the KFE property.

### **A. Method**

The amount of SWP water recharged in the KWB was compared to the unused absorptive capacities available in other existing recharge projects in Kern County to which the KCWA had access. If the SWP water was less than the total unused absorptive capacity of the other recharge projects in the Kern Fan area, it was assumed that the SWP water recharged in the KWB could have all been recharged elsewhere. This comparison was done on a monthly basis using delivery records from 1995-2004 and is limited to recharge projects in the Kern Fan area.

The Kern Fan Projects include the: Berrenda Mesa Project (operational since 1983); City of Bakersfield (COB) 2800 Acres (operational since 1978); Pioneer Project, including the Kern River Channel (operational since 1995);<sup>14</sup> and the Kern Water Bank (operational since 1995). The KCWA owns the Pioneer Project, and provides services to operate the KWB, owned by the KWBA, and the Berrenda Mesa Project, owned by the Berrenda Mesa Water District. The KCWA has a contract with the City of Bakersfield for use of the COB 2800 Acres.

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<sup>14</sup> The Kern River Channel is part of the Pioneer Project but is also used by others, in accordance with established priorities for its use. To account for higher priority use by others, the Kern River Channel was analyzed separately from the rest of the Pioneer Project.

This analysis does not include KCWA use of certain KWB facilities that existed and had been used by KCWA for recharge prior to 1995. The KWB facilities that existed prior to 1995 included: KWB canals, which DWR allowed KCWA to use for recharge purposes in 1993; and KWB recharge ponds constructed by Tenneco on the KFE property prior to DWR's purchase of the property from Tenneco. The additional absorptive capacity provided by these KWB facilities and the local districts was not included in this analysis since adequate capacity was available in the other Kern Fan Projects to absorb the SWP water recharged on the KWB.

## **B. Analysis Assumptions**

### 1. Absorptive capacity

- a. The absorptive capacity for each Kern Fan Project was determined based on an initial recharge rate for that project, and during periods of continuous use, assumed rates of decline. Declines were determined based on analysis of historic rate declines. Absorptive capacities were determined by project and by month from 1995 through 2004.
- b. Initial fill rates, based on historic initial recharge rates, were used for the first month of the first recharge period, and for the first month of any subsequent recharge periods if the project had not been operated for three or more months between recharge periods. If the project had not been operated for less than three months, the initial fill rate for the subsequent recharge period was assumed to be 88% of the initial fill rate.
- c. In a month when water had not historically been recharged at a particular Kern Fan Project, the shifting of water that had been recharged on the KWB to that project would trigger a recharge rate decline. The water that had been recharged on the KWB was assumed to be absorbed at the Kern Fan Projects in the following order of priority: 1) Pioneer, 2) COB 2800 Acres, 3) Berrenda Mesa, and 4) Kern River Channel. Recharge rate declines were triggered once that project was needed.
- d. Daily deliveries to each recharge project were reviewed. During certain months when Article 21 water was not available for the entire month, absorptive capacities were further reduced to reflect only the number of days when that water was available.
- e. Details for each of the other Kern Fan Projects on initial fill rates and assumed rates of decline are included at the end of this section.

### 2. Unused absorptive capacity available

The unused absorptive capacity available for recharge of the SWP deliveries to the KWB at a project in a given month was calculated as the absorptive capacity that month minus the total of all actual deliveries from all sources to that project in that month.

### 3. Ability to absorb SWP deliveries to KWB in other recharge projects

The ability to move SWP water recharged on the KWB in a particular month to other months in that same year depends on the type of SWP water delivered. Table A water or other SWP water that can be scheduled, can be rescheduled and shifted to any other month that year. Article 21 water is unregulated water DWR makes available for only temporary periods, and

can only be shifted among those months within a year this water is available. For these water types, the following assumptions were made:

- a. An “Article 21 period” was identified during which Article 21 water was delivered to KCWA. The timing and duration of this period was determined using DWR Bulletin 132 and KCWA records. When Article 21 water was available for only part of the month, absorptive capacities were limited to the number of days Article 21 water was available. SWP deliveries to the KWB could be shifted to available capacity in the other Kern Fan Projects in any other month Article 21 water was available during that same year.
- b. Months that were not in the Article 21 period were assumed to be “regulated”. Table A or other scheduled SWP water could be shifted to available capacity in the other Kern Fan Projects in any other month during that same year.

#### Absorptive Capacity Assumption Details in Order of Priority

##### Pioneer Project

- Jan. – Mar. 1995 - Recharge capacity was only available in the James and Pioneer Canal systems. Initial delivery rates were 85 cfs/day, or 5,226 AF/month. Recharge amounts have been adjusted for the number of days in each month.
- Apr. – Jun. 1995 – New construction completed the Pioneer recharge facilities in June of 1995. Initial delivery rates increased to 260 cfs/day.
- Using historical delivery data to the Pioneer Project, and assuming continuous recharge, monthly recharge capacity declines are assumed as follows:
  - 1<sup>st</sup> month – 100% (initial fill capacity)
  - 2<sup>nd</sup> month – 6% decline (1<sup>st</sup> month x 0.94)
  - 3<sup>rd</sup> - 6<sup>th</sup> month – 12% decline per month (previous month x 0.88)
  - 7<sup>th</sup> month forward – 1% decline per month (previous month x 0.99)

##### City of Bakersfield 2800 Acres

- Initial fill rate in COB 2800 Acres – 500 cfs. Assumption based on actual 30-day average of flow rates to the project at start up.
- Using historical delivery data from the COB 2800 Acres and assuming continuous recharge, monthly recharge capacity declines are assumed as follows:
  - 1<sup>st</sup> month – 100% (initial fill capacity)
  - 2<sup>nd</sup> month – 6% decline (1<sup>st</sup> month x 0.94)
  - 3<sup>rd</sup> - 8<sup>th</sup> month – 12% decline per month (previous month x 0.88)
  - 9<sup>th</sup> – 12<sup>th</sup> month – 6% decline per month (previous month x 0.94)
  - 13<sup>th</sup> month forward – 1% decline per month (previous month x 0.99)

##### Berrenda Mesa Project

- Initial fill rate in Berrenda Mesa Project Ponds – 75 cfs.
- Additionally, initial Kern River losses to COB 2800 Acres – 15 cfs.
- Using historical delivery data to the Berrenda Mesa Project and assuming continuous recharge, monthly recharge capacity declines are assumed as follows:

- 1<sup>st</sup> month – 100% (initial fill capacity)
- 2<sup>nd</sup> month – 6% decline (1<sup>st</sup> month x 0.94)
- 3<sup>rd</sup> - 6<sup>th</sup> month – 12% decline per month (previous month x 0.88)
- 7<sup>th</sup> month forward – 1% decline per month (previous month x 0.99)

### Kern River Channel

- Maximum absorptive capacity – 11,900 AF/month (Approximately 200 cfs)
- Assuming continuous recharge, monthly recharge capacity declines are assumed as follows:
  - 1<sup>st</sup> month – 100% (initial fill capacity)
  - 2<sup>nd</sup> month – 6% decline (1<sup>st</sup> month x 0.94)
  - 3<sup>rd</sup> - 6<sup>th</sup> month – 12% decline per month (previous month x 0.88)
  - 7<sup>th</sup> month forward – 1% decline per month (previous month x 0.99)

Note: The absorptive capacity on the Kern River Channel was needed and evaluated only in 1995 and 1996. Use of this capacity was not needed in the remaining years.

## **C. Results**

A summary of the results of this analysis are presented in Table 16. The summary table shows the ability to absorb the SWP supplies recharged on the KWB considering the unused absorptive capacity of Kern Fan Projects (i.e., the Berrenda Mesa Project, the COB 2800 Acres, and the Pioneer Project, including the Kern River Channel).

Table 10 presents results separately for the Article 21 period (when Article 21 water was determined to be available), the regulated period when only scheduled supplies were available, and the total for January through December.

Within Table 10, actual SWP deliveries to the KWB are shown as negative numbers. The positive numbers for the other projects show the unused absorptive capacity. Therefore, if the total shown at the bottom of each table is positive, it means the unused absorptive capacity available exceeded the amount of SWP water delivered to the KWB, so all of that SWP water could have been recharged in these other projects. If the total shown at the bottom of each table is negative, the unused absorptive capacity available was less than the amount of SWP water delivered to the KWB, so some of that SWP water would not have been recharged.

The results show that all SWP deliveries to the KWB from 1995 through 2004 could have been recharged in the other Kern Fan Projects.

**Table 10. Kern Fan Banking Project's Ability to Absorb State Water Project Supplies Recharged on Kern Water Bank**

YEARLY SUMMARY BY SWP TYPE  
NO RECHARGE CAPACITY ON KERN WATER BANK

		ARTICLE 21 PERIOD SUMMARY									
Project	Year>	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Berranda Mesa		3,934	4,404	4,363	0	3,983	4,507	1,964	1,785	295	770
2800 Acres		15,412	5,588	3,189	0	12,523	15,149	8,370	13,594	5,441	12,218
Kern Water Bank		0	-17,237	-9,386	0	-5,970	-18,898	-10,030	-6,380	-4,632	-16,151
Pioneer Property		12,374	7,083	1,866	0	20,085	5,833	4,420	3,723	1,452	4,974
Kern River Channel		3,370	3,740	0	0	0	0	0	0	0	0
	Total	35,090	3,579	32	0	30,620	6,591	4,723	12,723	2,556	1,811

		REGULATED SUMMARY									
Project	Year>	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Berranda Mesa		5,067	17,376	0	19,800	0	0	0	0	5,234	4,527
2800 Acres		47,425	52,822	33,304	100,868	55,143	40,532	0	0	30,403	0
Kern Water Bank		-70,329	-70,255	-30,663	-51,155	-20,041	-557	0	0	-35,742	-1,914
Pioneer Property		29,481	45,402	47,755	37,795	46,413	44,091	0	0	36,484	18,963
Kern River Channel		13,191	4,163	0	0	0	0	0	0	0	0
	Total	24,835	49,508	50,395	107,309	81,514	84,066	0	0	36,378	21,575

		YEARLY SUMMARY									
Project	Year>	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Berranda Mesa		9,002	21,780	4,363	19,800	3,983	4,507	1,964	1,785	5,529	5,297
2800 Acres		62,837	58,411	36,493	100,868	67,665	55,681	8,370	13,594	35,844	12,218
Kern Water Bank		-70,329	-87,492	-40,049	-51,155	-26,011	-19,455	-10,030	-6,380	-40,374	-18,065
Pioneer Property		41,855	52,485	49,620	37,795	66,497	49,925	4,420	3,723	37,935	23,937
Kern River Channel		16,560	7,903	0	0	0	0	0	0	0	0
	Total	59,925	53,087	50,427	107,309	112,134	90,658	4,723	12,723	38,934	23,387

## **VIII. Effects of KWB Development and Operations**

### **A. Groundwater Hydrology and Quality**

#### **1. Existing Conditions in 1995**

The Department divides the Central Valley of California into two groundwater basins, the Sacramento Valley Groundwater Basin and the San Joaquin Valley Groundwater Basin. It further divides the San Joaquin Valley Groundwater Basin into subbasins, one of which, the Kern County Subbasin, would be affected by the proposed project. Kern County subbasin lies at the south end of the San Joaquin Groundwater Basin.

The San Joaquin Valley was formed by deposition of sediment in a north-northwestern trending trough. The aquifer system in the valley consists of continental and marine deposits several miles deep. The upper 2,000 feet generally contain fresh groundwater. The sediments that contain the aquifer system are primarily Tertiary- and Quaternary-aged continental sediments derived from the Coast Range to the west and the Sierra Nevada to the east. Overlying these formations are flood plain deposits. A significant hydrogeologic feature is the Corcoran Clay. This clay layer divides the aquifer system into two distinct aquifers, an unconfined to semi-confined upper aquifer above the clay layer and a confined aquifer below it.<sup>v</sup> However, the clay layer is not continuous, and is absent in portions of the Kern County Subbasin.

Historically, the upper aquifer system in the Kern County Subbasin was recharged by precipitation, infiltration from rivers and lakes and lateral inflow along the basin boundaries. The main surface water feature in the Kern County Subbasin is the Kern River. Before European settlement the Kern River flowed to Kern and Buena Vista Lakes and extensive wetlands. During wet periods, the lakes overflowed to Tulare Lake to the north, which itself overflowed into the San Joaquin River watershed. Groundwater levels in the basin varied but reached artesian conditions in the lowest parts of the subbasin.

In the 1860s, ranchers raised livestock and dry farmed wheat in the San Joaquin Valley portion of Kern County. In the 1870s, farmers began diverting the waters of the Kern River to irrigate their crops. For two decades, irrigators relied almost exclusively on surface waters for their water supplies, but in the 1890s, some took advantage of improvements in pumping technology and began turning to more reliable groundwater supplies.<sup>vi</sup> Increasing use of groundwater caused the water table in parts of Kern County to fall by as much as 400 feet by 1960. Groundwater extraction between 1926 and 1970 has caused the ground surface to subside by eight to nine feet in the central part of the Kern County Groundwater Subbasin.<sup>vii</sup>

Surface water imports to the area began in 1949 with the completion of the CVP's Friant-Kern Canal and increased in the 1960s and 1970s, as water from the SWP became available. Many irrigators contracted for deliveries of imported surface water and were able to reduce their use of groundwater. As a result, groundwater levels in some parts of the southern San Joaquin Valley began to rise.

KCWA, the largest of the SWP's agricultural contractors, and other agencies in Kern County, manage surface and groundwater in the San Joaquin Valley portion of Kern County. Their surface water sources include flood flows from the Kern River, CVP deliveries from the Friant-Kern Canal and SWP deliveries from the California Aqueduct. Their groundwater source is the aquifer that underlies much of the land within the KCWA boundaries.

For many years, water agencies in Kern County have practiced conjunctive use of their surface and groundwater sources; that is, they actively manage their surface and groundwater sources to take advantage of the unique characteristics of each type of water source. Kern County agencies utilize in-lieu recharge and direct recharge management practices. In-lieu recharge is a water management practice that modifies the irrigation practices of water users who have access to surface water supplies and groundwater supplies. It substitutes surface water for irrigation in-lieu of normal groundwater pumping to increase groundwater supplies and conserve groundwater for use in future years. Direct recharge (artificial recharge) is a water management practice that applies water to percolation ponds to increase groundwater recharge and store water in an aquifer for later extraction.

When surface waters are available from the Kern River, the CVP or the SWP, farmers use surface waters to irrigate crops. When surface water supplies are insufficient, farmers supplement their surface water supplies with groundwater. When surface water availability exceeds farmer's needs, KCWA and those other water agencies with groundwater recharge facilities percolate the surface water to recharge the groundwater basin. Other agencies that manage groundwater banks with in-lieu recharge will then use any excess surface water in lieu of pumped groundwater, with the objective of allowing the basin to recover and/or storing this water for subsequent withdrawal.

Kern County water agencies manage groundwater banks for use by other agencies as well as their own in-county use. The agencies use direct and in-lieu recharge to bank groundwater for their own later recovery. Some Kern County agencies also offer groundwater banking, which is the storage of a non-Kern County agency's water in Kern County groundwater basins for later recovery. The agencies can recover the water for the non-Kern County agency by direct pumping and conveyance of the water to the non-Kern County agency, or the Kern agencies can recover the water through an in-lieu exchange. Under an in-lieu exchange, the SWP or non-SWP water that would otherwise have been delivered to the Kern County agency would instead be delivered to the non-Kern County agency, and the Kern County agency would pump a like amount of the non-Kern County agency's stored water for use within the Kern County agency's service area. The third party could be a water agency located outside Kern County, or it could be a KCWA member agency that has access to the groundwater basin underlying parts of the KCWA service area. The third party makes an agreement with the groundwater bank operator to store and recover water from the groundwater basin.

Figure 9.2-1 shows total water supplies and water demand in the San Joaquin Valley portion of Kern County between 1970 and 1999. In years when total surface water supplies exceeded demand, the excess supply was added to groundwater storage. In years when total surface water supplies were insufficient to meet demand, groundwater was pumped to meet demand and groundwater storage decreased. Between 1970 and 1995, groundwater storage declined by 6.6

million AF, an average reduction in storage of 264,000 AF per year. Figure 9.2-2 shows cumulative groundwater storage for the period 1970 to 1995. During most of the 1970s, groundwater storage declined as a result of dry conditions and limited access to SWP water due to distribution system limitations. Groundwater storage increased from 1978 until the mid-1980s when a ten-year dry period began, resulting in a decline of approximately 7.3 million AF, compared to 1970 storage levels.<sup>viii</sup>

## **2. Effects of Transfer, Development, and Operations**

For many years, Kern County farmers and water agencies have practiced conjunctive use of surface and groundwater sources. They also practice groundwater banking. Between 1971 and 1994, 1.15 million AF of water was delivered for banking within the San Joaquin Valley portions of Kern County, an average of about 48,000 AFY, using water from local, SWP, and CVP supplies. With a few exceptions, this water was banked for KCWA and its member agencies.

Groundwater banking in Kern County increased after 1995. Between 1995 and 2000, 2.38 million AF of water was delivered for banking within the San Joaquin Valley portions of Kern County, an average of about 397,000 AF per year. There were four reasons for the increase, two of them related to the Monterey Amendment.

A primary reason for increased groundwater banking was recognition by Kern County that they would need to take measures to improve the reliability of their water supplies. The extended drought of 1987 through 1992, including 1991 when agricultural contractors received a zero percent SWP allocation, highlighted the hydrologic uncertainty of SWP supplies. At the same time, the listing in the early 1990s of several Delta fish species as threatened or endangered, along with proposed regulatory and operational constraints to protect them, highlighted the regulatory uncertainty that could further reduce SWP supply reliability. In response, KCWA and its member agencies began aggressive development of banking programs to store wet-year supplies for their use in dry years.

A second reason for increased banking was the series of wet years that followed the drought. Beginning in 1995 and continuing through the late 1990s, these consecutive wet years provided abundant excess water for the contractors and others to store in the Kern County Groundwater Subbasin.

The next two reasons relate to the Monterey Amendment. Although DWR, on a policy basis, had approved out-of-service area banking prior to the Monterey Amendment (i.e., the Semitropic WSD banking program), the Amendment provided a contractual assurance that contractors would be able to store SWP water outside their service areas. Of the total amount delivered for banking within Kern County between 1995 and 2000, about 503,000 AF was provided by contractors for storage outside their service areas in banking programs approved after implementation of the Monterey Amendment. The Monterey Amendment also transferred ownership of the KFE property to local interests, and the KWBA developed percolation ponds and wells on the property for groundwater banking by its participating members. Of the total amount delivered for banking within Kern County between 1995 and 2000, about 873,000 AF

was for banking at the KWB. As was shown in Section VII, all of the SWP water banked at the KWB during this period could have been banked in available capacity in other existing banking projects in the Kern Fan area. Therefore, much of the water banked at the KWB would have been banked in Kern County, even without the KFE property transfer.

So while groundwater banking increased in Kern County after 1995, it occurred for a number of reasons. Of the total 2.38 million AF delivered for banking in Kern County between 1995 and 2000, more than half was, or otherwise would have been, banked in existing banking programs unrelated to the Monterey Amendment.

Between 1995 and 2005, KWB participants placed about one million AF more water in groundwater storage in Kern County than they withdrew (see Table 9). KCWA estimates that every 100,000 AF of water placed in storage causes a rise of one foot in the groundwater level in the San Joaquin Valley portion of Kern County. Thus, storage of water in the KWB probably raised groundwater levels by about 10 feet between 1995 and 2005.

During the late 1990s and early 2000s, KWB participants appeared to be setting aside the stored water for use in dry periods rather than using it to increase their average annual deliveries of SWP water. This operating practice would result in water remaining in storage for several years and only being drawn down occasionally. Overall, the effect of the additional groundwater banking facilitated by the KWB was to raise groundwater levels in Kern County by several feet relative to the baseline scenario. Thus, the KWB had a modestly beneficial effect on groundwater levels in Kern County between 1995 and 2005 relative to the baseline, and is therefore a *less-than-significant impact*.

## **B. Terrestrial Biological Resources**

### **1. Existing Conditions in 1995**

The approximately 19,900 acre KFE property is located in Kern County, about 20 miles west of Bakersfield and 10 miles south of Buttonwillow. Interstate 5 and the Kern River both bisect the area. The KFE property had historically been subject to periodic flooding from the Kern River, and is able to absorb water at an extremely high rate, retaining it in underground aquifers. The land was used for cattle grazing in the 1880s, and then crop production in the 1930s. It was also explored for gas and oil resulting in numerous wells and pipelines. The Department purchased the land in 1988 with the intention of creating a groundwater bank. In 1994, four special-status plants and eleven special-status animals were known to occur on the KFE property (see Table 11) Note: for this study, ADEIR Table 9.4-2 was revised to include only that information relevant to the KFE property).

Prior to the Department's purchase of the KFE property, approximately 17,068 acres of the property was under extensive cultivation.<sup>ix</sup> The remaining property contained 1,515 acres of isolated sensitive native plant communities (valley saltbush scrub, Great Valley mesquite scrub and valley sacaton grassland) and 1,317 acres of non-native grassland, which had been leased for

oil recovery facilities. No wetland habitat was present in the project area, except for the canals used to convey agricultural water.

After the Department acquired the property, it continued to be farmed by tenants for several years. One of the tenants' leases was terminated in 1989. Then in 1991, at the peak of the drought, all the remaining tenants leases were terminated, and thereafter the lands were fallowed.

<b>TABLE 11</b>				
<b>SPECIAL-STATUS SPECIES WITH KNOWN OCCURRENCES AND THE POTENTIAL TO BE IMPACTED ON THE KERN FAN ELEMENT PROPERTY</b>				
Species Name	Status <sup>(1)</sup> Federal/State/CNPS		Habitat	Kern Fan Element Property
	1994	2003		
<b>Plants</b>				
Hoover's woolly- star (eriastrum) <i>Eriastrum hooveri</i>	T/-/4	D/-/4	Alkali sinks, washes. Usually on silty to sandy soils.	X
Recurved larkspur <i>Delphinium recurvatum</i>	C2/-/1B	SC/-/1B	On alkaline soils	X
San Joaquin woollythreads <i>Monolopia (Lembertia) congdonii</i>	E/-/1B	E/-/1B	Alkaline or loamy plains, sandy soils	X
Slough thistle <i>Cirsium crassicaule</i>	C2/-/1B	SC/-/1B	Sloughs, riverbanks, and marshy areas	X
<b>Amphibians</b>				
Western spadefoot <i>Scaphiopus hammondii</i>	C2/CSC	SC/CSC	Primarily grassland habitats, requires vernal pools for breeding and egg-laying.	X
<b>Reptiles</b>				
Blunt-nosed leopard lizard <i>Gambelia sila</i>	E/E, FP	E/E, FP	Sparsely vegetated alkali and desert scrub habitats, in areas of low topographic relief.	X
Western pond turtle <i>Emys marmorata (includes both subspecies)</i>	C2/CSC	SC/CSC	Permanent or nearly permanent bodies of water; requires basking sites, and suitable nesting sites	X
<b>Birds</b>				
Burrowing owl <i>Athene cunicularia</i>	C2/CSC	SC,BCC/CSC	Subterranean nester, dependant upon burrowing mammals, Burrow sites typically in open, dry annual or perennial grasslands, deserts and scrublands characterized by low-growing vegetation.	X
California thrasher <i>Toxostoma redivivum</i>	-/-	SC/-	Lowland and coastal chaparral, riparian thickets	X
Cooper's hawk <i>Accipiter cooperii</i>	-/CSC	-/CSC	Nests in riparian growths of deciduous trees, as in canyon bottoms of river floodplains, within open, interrupted or marginal woodland.	X
Double-crested cormorant <i>Phalacrocorax auritus</i>	-/CSC	-/CSC	Fresh, brackish, and salt water, along coastal regions and inland lakes	X

**TABLE 11**

**SPECIAL-STATUS SPECIES WITH KNOWN OCCURRENCES AND THE  
POTENTIAL TO BE IMPACTED ON THE KERN FAN ELEMENT PROPERTY**

Species Name	Status <sup>(1)</sup> Federal/State/CNPS		Habitat	Kern Fan Element Property
	1994	2003		
Lawrence's goldfinch <i>Carduelis lawrencei</i>		SC/	Oak and riparian woodland, chaparral, pinion/juniper woodland, and weedy areas near water.	X
Loggerhead Shrike <i>Lanius ludovicianus</i>	C2/CSC	SC,BCC/CSC	Prefers open country for hunting, with perches for scanning, and fairly dense shrubs and brush for nesting. Typically nests in broken woodlands, savannah, pinyon-juniper, Joshua tree, and riparian woodlands, desert oases, scrub, and wash.	X
Northern Harrier <i>Circus cyaneus</i>	-/CSC	-/CSC	Breeds in shrubby vegetation within marshes, or grasslands.	X
Swainson's hawk <i>Buteo swainsoni</i>	-/T	SC,BCC/T	Breeds in stands with few trees in Juniper-sage flats, riparian areas and oak savannahs. Requires adjacent suitable foraging areas such as grasslands, or alfalfa or grain fields supporting rodent populations.	X
White-tailed (black shouldered) kite <i>Elanus leucurus</i>	-/*	SC,MNBMC/ FP	Open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching. General nesting habitat is rolling foothill/valley margins with scattered oaks and river bottomlands or marshes next to deciduous woodland.	X
<b>Mammals</b>				
American badger <i>Taxidea taxus</i>	-/CSC	-/SA (CSC in 2006)	Need friable soils and open, uncultivated ground in drier open stages of most shrub, forest, and herbaceous habitats.	X
Buena Vista Lake shrew <i>Sorex ornatus relictus</i>	C1/CSC	E/CSC	Marshlands and riparian areas in the Tulare Basin. Prefers moist soil. Uses stumps, logs and litter for cover.	X
San Joaquin antelope squirrel <i>Ammospermophilus nelsoni</i>	C2/T	SC/T	Western San Joaquin Valley on dry, sparsely vegetated loam soils. Need widely scattered shrubs, forbs and grasses in broken terrain with gullies and washes	X
San Joaquin kit fox <i>Vulpes macrotis mutica</i>	E/T	E/T	Needs loose-textured sandy soils for burrowing, and suitable prey base, in annual grasslands or grassy open stages with scattered shrubby vegetation.	X

**TABLE 11**

**SPECIAL-STATUS SPECIES WITH KNOWN OCCURRENCES AND THE POTENTIAL TO BE IMPACTED ON THE KERN FAN ELEMENT PROPERTY**

Species Name	Status <sup>(1)</sup> Federal/State/CNPS		Habitat	Kern Fan Element Property
	1994	2003		
Tipton kangaroo rat <i>Dipodomys nitratoides nitratoides</i>	E/E	E/E	Needs soft friable soils which escape seasonal flooding within saltbrush scrub and sink scrub communities in the Tulare Lake Basin of the southern San Joaquin Valley	X
Yuma myotis <i>Myotis yumanensis</i>	C2/-/-	SC/	Optimal habitats are open forests and woodlands with sources of water over which to feed. Distribution is closely tied to the bodies of water. Maternity colonies in caves, mines, buildings or crevices.	X

Notes 1. Status explanation

Federal

E Listed as endangered under the Federal Endangered Species Act.  
T Listed as threatened under the Federal Endangered Species Act.  
C1 Category 1 Candidate for which the USFWS has on file sufficient information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened species. Proposed rules not yet issued because this action is precluded at present by other listing activity.  
C2 Category 2 Candidate for which information now in the possession of the USFWS indicated that proposing to list and endangered or threatened is possibly appropriate, but for which persuasive data on biological vulnerability and threat are not currently available to support proposed rules.  
SC Federal Species of Concern. The USFWS decided to no longer maintain C2 and C3 lists, and species formerly categorized as such were informally termed "Species of Concern." The Sacramento Fish & Wildlife Office maintains a list of *Species of Concern*. These species receive no legal protection and the use of the term does not mean that they will eventually be proposed for listing. In 2006, the USFWS stopped maintaining a Federal Species of Concern list.  
D Delisted – Delisted species are monitored for five years after being delisted.  
BCC US Fish and Wildlife Service, Bird of Conservation Concern  
MNBMC US Fish and Wildlife Service, Migratory Nongame Bird of Management Concern  
- No listing

State

E Listed as endangered under the California Endangered Species Act.  
T Listed as threatened under the California Endangered Species Act.  
CSC California Special Concern Species – categorized as such because of declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction.  
FP Fully Protected – Fully protected species may not be taken or possessed without a permit from the Fish and Game Commission.  
\* Taxa listed with an asterisk (\*) fall into one or more of the following categories – (1) Taxa that are biologically rare, very restricted in distribution, or declining throughout their range; (2) population(s) in California that are peripheral to the major portion of a taxon's range, but which are threatened with extirpation within California; and (3) taxa closely associated with a habitat that is declining in California (e.g. wetlands, riparian, old growth forest).  
SA Taxa found on the July 2003 Special Animals List, which have no legal or protection status.  
- No listing.

Other – California Native Plant Society  
1B Rare, threatened or endangered in California and elsewhere  
4 Plants of limited distribution.

Sources:  
USFWS List of Candidate Fauna from California and Nevada as of 31 August 1994 (59 FR 58982)  
Endangered and Threatened Wildlife and Plants 50 CFR 17.11 and 17.12, August 20, 1994.  
State and Federal Endangered Animals for California and Listing Dates, Department of Fish and Game, Revised January 1994.  
California Department of Fish and Game Natural Diversity Data Base Special Animals, December 1992 (The 1994 version could not be located).

**2. Effects of Transfer, Development, and Operations**

The Monterey Amendment called for ownership of the KFE property to be transferred from the Department to the KCWA, and then to the KWBA, which was completed in 1996 (upon

completion of the title search). In 1995, the KCWA received interim permits/authorizations from the USFWS and CDFG to initiate water banking to take advantage of a high availability of water due to a heavy snow pack in the Sierras. As a condition of the interim permit, KCWA was required to set aside permanent habitat mitigation land, which had moderate habitat value, or natural vegetation, until the long term HCP could be implemented on the KFE property.<sup>x</sup> The interim project was carried out in two stages. The first stage resulted in the rehabilitation of disused canals and inundation of 1,518 acres of former agricultural land. Pre-construction surveys were conducted, and revealed poor habitat values throughout the Stage 1 area, and no suitable habitat for listed species.

The second stage resulted in the inundation of 1,516 acres of grassland and fallow agricultural land, which had the potential to support listed species. Biological surveys were conducted in all areas proposed for disturbance by either construction or flooding and 58 potential San Joaquin kit fox dens were found to be unoccupied and destroyed; the animals did not return prior to construction. Approximately 300 potential Tipton kangaroo rat burrows were located during surveys, but were not monitored for the presence of Tipton kangaroo rat. If any of these burrows were inhabited, then a take may have occurred if the animals were unable to escape. Approximately one-quarter to one-third of a known population of San Joaquin woolly threads were inadvertently covered with excavated soils during project construction. The location of this plant was not identified prior to construction, but upon discovering the damage, the area was flagged and avoided. *[Comment: Could you please provide us with a reference for these statements regarding the Tipton Kangaroo rats and San Joaquin woolly threads. Current KWBA staff are unfamiliar with these incidents and would like to verify their accuracy.]* Construction of the recharge basins resulted in the loss of potential San Joaquin kit fox and Tipton kangaroo rat habitat, the potential take of Tipton kangaroo rat, and the destruction of a portion of the San Joaquin woolly thread population. This was not fully mitigated for prior to project construction, but has been mitigated for through post-construction participation in the KWB HCP/NCCP.

Since 1996, the KWBA has been responsible for land management on the KFE property. Lands have been managed in accordance with a HCP/NCCP approved by USFWS and CDFG in 1997.<sup>xi</sup> The KWB HCP/NCCP documents a plan to accomplish both water conservation and environmental objectives, mitigating project specific impact to less than significant at a regional level. The primary water conservation objective is the storage of water in aquifers during times of surplus for later recovery during times of shortage. The primary environmental objective is to set aside large areas of the KFE property for endangered, threatened and other sensitive species and to implement a program to protect and enhance the habitat.

Under the KWB HCP/NCCP, the 19,900-acre KFE property was divided up for different land uses (see Table 1).

- Recharge Basins and Other Banking Facilities – Permanent operation of the banking facilities included the flooding of basins, constructing facilities for recovery of the water from underground aquifers and maintenance of all project facilities.
- Compatible Habitat – This habitat is largely fallowed agricultural land that has become established as non-native annual grassland that has been preserved and managed around

the banking facilities. It will provide upland habitat for San Joaquin kit foxes and other upland species.

- Sensitive Habitat – Three areas of sensitive habitat containing remnant native saltbush and valley sink scrub habitat have been identified. They are comprised of historic upland habitat and non-farmed locations of the KFE property and will benefit native upland species. These areas will be protected throughout the life of the permit.
- Department Mitigation Land – A 530-acre conservation easement has been established on the KFE property to mitigate other projects carried out by the Department prior to the transfer of this land to the KCWA. This easement will be managed by KWBA in accordance with the management plan established for the area.
- KWBA Mitigation Land – A 435-acre conservation easement has been established in the Kern Fan Element to mitigate KWBA projects on KWB lands. This easement will be managed by KWBA in accordance with the management plan established for the area.
- Farming – 3,170 acres of the project site may be farmed in a manner appropriate to soil conditions found on site. The land may also be used for water recharge and recovery purposes, including recharge basins, levees and related uses.
- Conservation Bank - 3,267 acres of potential and occupied habitat has been designated for a conservation bank. Pursuant to the HCP, KWBA may use, or sell up to 490 acres of this habitat for commercial development. However, KWBA has agreed not to sell or use the 490 acres as a condition of the Monterey Settlement Agreement. Much of this land was pre-approved mitigation land by CDFG and is adjacent to other land preserved in the area. KWBA can use or sell up to 3,267 conservation credits to landowners, developers and others for mitigation for projects within the Master Permit Credit Area.

Between 1998 and 2003, the KWBA built an additional 4,080 acres of shallow recharge basins on the KFE property. Some of acres were located within an area designated for farming.<sup>xii</sup> Of the original 3,267 acres of available conservation credits, 744 acres have been sold as of December 31, 2005.

Several measures were implemented in accordance with the KWB HCP/NCCP, to reduce impacts on native or migratory wildlife using the KFE property, including:

- 1) Maintaining water levels constant, to the extent possible to prevent impacts on birds nesting in the recharge basins;
- 2) Slowly refilling basins and canals that have been idle for more than two years, so that any covered animals will be able to escape before drowning;
- 3) Constructing shallow canal side slopes to allow animals to escape from the interior and extending internal access roads across new canals, which would provide access for animals to cross the canal when wet;
- 4) Surveying unused canals that will be used in the near future, prior to the burrowing owl nesting season. Any burrows found will be collapsed, in consultation with the Resource Agencies, to prevent nesting in those locations.
- 5) Vegetation removal from roadways, turnouts, interbasin structures, road crossings and control structures will be accomplished by burning, motor grading (used minimally), mowing, herbicide or hand. Vegetation removed from canals and basins will be

- accomplished by hand control, lightweight equipment (weed-eaters), grazing, mowing and burning; and
- 6) Complying with the “Interim Measures for Use of Rodenticides in Kern County,” in order to prevent damage to facilities from rodents and to prevent the poisoning of listed species.

A Vegetation Management Plan was created to describe cost effective vegetation management and restoration practices for the long-term adaptive management and enhancement of the Kern Water Bank. Protection of existing and newly established sensitive habitats, vegetation management of compatible habitat using effective, low-cost adaptive methods and exotic pest plant control are primary goals under this management plan.

Under the HCP, the KWBA has authorization to incidentally take (including harm or harass) 161 covered species that are listed, or may be listed in the future under FESA. Of these species, fourteen special-status plants and animals have recorded occurrences on the KFE property. Since the approval of the HCP/NCCP, only one incidence of take has been reported or is known to have occurred on the KFE property.<sup>xiii</sup> In 1999, during the construction of the KWB Canal, some Tipton kangaroo rats were captured and temporarily relocated to avoid harming them. After construction was complete, they were reintroduced into the area they had originally inhabited.

In addition to the KWB HCP/NCCP, an Initial Study and Addendum was prepared for the KWB, which included mitigation measures to reduce impacts on terrestrial biological resources. These mitigation measures, in addition to measures from the HCP/NCCP have reduced the impact of the KWB to a *less-than-significant level*, and are incorporated into this document to mitigate for future impacts of the proposed project, as discussed under Impact 9.4-3B.

## C. Visual Resources

### 1. Existing Conditions in 1995

The KFE property consists of about 19,900 acres of land located in Kern County, southwest of Bakersfield. The KFE property lies on both sides of the Kern River but does not include the river itself, or the lands within the river levees. The terrain is flat with no more than a few feet of topographical relief. Prior to 1995, there were no major structures on KFE property except for Interstate 5 (I-5), the Cross Valley Canal, some abandoned tanks and other oil-field equipment, and about 300 acres of percolation ponds.

The KFE property was farmed for many years until the mid-1980s. After the Department purchased the land in 1988, it continued to be farmed by tenants for several years. One of the tenants' leases was terminated in 1989. Then in 1991, at the peak of the drought, all the remaining tenants leases were terminated, and thereafter the lands were fallowed. By 1995, introduced annual grasses and forbs had colonized the land.

## **2. Effects of Transfer, Development, and Operations**

Prior to 1995, approximately 300 acres of shallow percolation ponds existed on the KFE property. These ponds had been constructed before the Department acquired the property. Between 1995 and 2003, KWBA constructed 4,699 acres of recharge ponds within the Recharge Sector and 2,415 acres of ponds within the Farming Sector, for a total of 7,114 acres of recharge ponds (see Section V.C.2.a). The KWBA also constructed the Kern Water Bank Canal, a six-mile long earthen canal extending from the Kern River to the California Aqueduct.<sup>xiv</sup> The Kern Water Bank Canal has a uniform cross-section and is confined between earthen levees. It is a prominent feature in the landscape but one that is visually consistent with other waterways in the area including the Cross Valley Canal and the California Aqueduct.

Although these land use changes have altered the appearance of lands within the KFE property, they did not alter the overall visual character of the area. The changes would be seen by a limited number of viewers and would probably be noticed by even fewer. The alteration in visual resources is considered to be a *less-than-significant impact*.

### **D. Air Quality**

#### **1. Existing Conditions in 1995**

Kern and Kings Counties are in the San Joaquin Valley Air Basin (SJVAB). This air basin is in non-attainment of federal and State standards for both PM<sub>10</sub> and ozone. The SJVAB also has areas where TACs are problematic. In 1995, the SJVAB was designated by the U.S. Environmental Protection Agency (EPA) as being in “serious” non-attainment for the federal one-hour ozone standard. No other federal ozone standard was in place at the time. This led to the preparation of the 1994 Ozone Attainment Plan, which was prepared by the local air agency and was adopted in November of 1994. The SJVAB was also in “serious” non-attainment of the federal PM<sub>10</sub> standard and developed a plan to bring the basin into attainment of the standard.

In 1995, the State as a whole experienced health impacts from TACs, mostly from diesel particulate matter. At that time, Kern County had several areas where the estimated inhalation cancer risk was greater than 250 per million people.

#### **2. Effects of Transfer, Development, and Operations**

By 2003, the air basin’s attainment status had been changed to “severe” nonattainment for the federal ozone standard. The SJVAPCD was also readying to petition the EPA to reclassify the Basin to “extreme” for one-hour ozone standard to allow the Basin more time to attain the standard. The Basin remained a “serious” non-attainment area for the federal PM<sub>10</sub> standard. The Basin also remained a non-attainment area for State ozone and PM<sub>10</sub> standards. The SJVAPCD thresholds of significance in 2003 was 10 tons/year of ROG, 10 tons/year NO<sub>x</sub>, and an excess cancer risk of 10 in one million from TACs. Risk from diesel particulate matter in the

Basin had improved since 1995, but areas still existed where Toxic Air Contaminants (TAC) risk was high.

Prior to 1995, approximately 300 acres of shallow percolation ponds existed on the KFE property. These ponds had been constructed before the Department acquired the property. Between 1995 and 2003, KWBA constructed 4,699 acres of recharge ponds within the Recharge Sector and 2,415 acres of ponds within the Farming Sector, for a total of 7,114 acres of recharge ponds (see Section V.C.2.a). The KWBA also constructed the Kern Water Bank Canal, a six-mile long earthen canal extending from the Kern River to the California Aqueduct.<sup>xv</sup>

Construction of the percolation ponds, canal, and other facilities required the use of heavy-duty construction equipment. This equipment generated diesel particulate matter, which is a TAC, as well as emissions of ozone precursors such as ROG and NO<sub>x</sub>. The disturbance of the soil associated with the various earthmoving activities also generated PM<sub>10</sub>. Because the proposed project would have implemented all of the SJVAPCD's suggested PM<sub>10</sub> control measures, PM<sub>10</sub> construction emissions would be below SJVAPCD thresholds. Based on a conservative assumption of 800 acres per year of soil disturbance to construct the ponds, NO<sub>x</sub> and ROG emissions would not have exceeded SJVAPCD thresholds. Further, the duration of construction-generated air pollutant emissions was limited to the construction periods only.

Operation of the facilities requires pumping to convey water to percolation ponds and to extract water from underground. With the KWB, there would have been increased pumping to convey water through the system, as compared to pre-project conditions. While electric pump use would have increased, this would not have increased air emissions, as electric pumps are relatively pollution-free.

Therefore, because the KWB did not result in a net increase in criteria air pollutants over SJVAPCD annual thresholds in a non-attainment area, there would have been no conflict with implementation of the adopted air quality plan for the region. This is considered to be a *less-than-significant impact*. Further, any construction-related emissions would have been temporary. Operational emissions would not likely have exceeded adopted criteria.

## **E. Geology and Soils**

### **1. Existing Conditions in 1995**

The San Joaquin Valley basin is bordered to the south and east by the Sierra Nevada and Tehachapi mountains, which are composed of crystalline igneous and metamorphic rock. Exposed consolidated marine sedimentary rock from the Coast Range are evident in the layer of sediment above bedrock underlying the San Joaquin basin. The KFE property overlies a large, deep, and asymmetrical sedimentary basin located in the southern portion of the San Joaquin Valley.

The marine sedimentary rock is overlain by a thick series of continental rocks and semi-consolidated to unconsolidated sediments. These sediments are several thousand feet thick under

the KFE lands, and encapsulate the primary groundwater basin. The portion of this sediment that is usable for groundwater storage is located above the base of the fresh water in the basin. This area of the groundwater basin is dominated by the alluvial fan and lake material that comprise the KFE lands. Further, groundwater development is limited to the upper portions of the fresh water aquifer system in this basin.

The southern San Joaquin Valley, including the KFE property, is dominated by the alluvial fan deposited by the Kern River, and consists of thick deposits of sand and gravel with extensive but discontinuous silt and clay beds.<sup>xvi</sup> The sand and gravel deposits are remnants of old streambed channels which generally occur in long, winding, and interconnecting stingers and sheets that are prevalent throughout the KFE property, but less evident along its borders. These sand and gravel deposits are highly permeable, but are imbedded with less permeable areas comprised of fine-grained silt and clay deposits. These silt and clay deposits are more extensive along the edges of the alluvial fan and in some areas may intersect with clay beds deposited in lakes. In general, the upper layers of the alluvial fan deposits form an unconfined to semi-confined aquifer system that provides a large amount of groundwater recharge area.

Soils in the southern portion of the San Joaquin Valley, including the KFE lands, range from highly permeable, coarse sandy soils to silty loam with very low permeability.<sup>xvii</sup> In general, the soils present are characterized as deep, well-drained sandy loam that have moderate to rapid permeability with low water retention, and have a slight erosion potential. These soils are interspersed with pockets of clay deposits that are characterized by low-permeability and are often associated with saline-alkali conditions.<sup>xviii</sup>

## **2. Effects of Transfer and Development and Operations**

Prior to 1995, approximately 300 acres of shallow percolation ponds existed on the KFE property. These ponds had been constructed before the Department acquired the property. Between 1995 and 2003, KWBA constructed 4,699 acres of recharge ponds within the Recharge Sector and 2,415 acres of ponds within the Farming Sector, for a total of 7,114 acres of recharge ponds (see Section V.C.2.a). The KWBA also constructed the Kern Water Bank Canal, a six-mile long earthen canal extending from the Kern River to the California Aqueduct.<sup>xix</sup> As previously described, grading was required to construct the percolation ponds. However, construction of the ponds and associated levees occurred on topography that is relatively flat and required only minor grading and compaction of soils. Furthermore, soils on the KFE property can generally be characterized as being slightly erodible. Therefore, although conversion of approximately 7,114 acres of land to percolation ponds changed rates of erosion, this impact is considered *less than significant*.

## **F. Land Use and Planning**

### **1. Existing Conditions in 1995**

In the 1980s, the Department began exploring the feasibility of developing an SWP groundwater storage facility in Kern County, which it called the KWB. As envisioned, the KWB was to consist of a series of “elements,” which would be geographically separate projects that would be operationally integrated. In 1988, Tenneco West sold approximately 20,000 acres of land in the Kern Fan area to the Department, which was intended to be used for development of one of these groundwater storage elements – the KFE. In 1993, uncertainties regarding the proposed groundwater storage facility ultimately convinced the Department to halt feasibility studies and design work on the project.<sup>xx</sup> The uncertainties were created by proposed water quality standards for the Delta and issues associated with the protection of threatened and endangered species, both of which would have reduced the amount of water that could be pumped from the Delta. Later, the Department concluded that these constraints on Delta pumping and other uncertainties made development of an SWP groundwater storage facility on the KFE property not feasible at the time.<sup>xxi</sup> In 1994, the potential of the Department’s proposed KFE for SWP groundwater storage remained unrealized, and the land on the KFE property remained undeveloped.

### **2. Effects of Transfer, Development, and Operations**

Prior to 1995, approximately 300 acres of shallow percolation ponds existed on the KFE property. These ponds had been constructed before the Department acquired the property. Between 1995 and 2003, KWBA constructed 4,699 acres of recharge ponds within the Recharge Sector and 2,415 acres of ponds within the Farming Sector, for a total of 7,114 acres of recharge ponds (see Section V.C.2.a). KWBA also constructed the Kern Water Bank Canal, a six-mile long earthen canal extending from the Kern River to the California Aqueduct.<sup>xxii</sup>

An HCP was developed for the KFE property. The HCP allows developed uses on about 4,000 acres of the KFE property (not including recharge ponds).<sup>xxiii</sup> Developed uses include farming, permanent facilities for the KWB and commerce. Approximately 490 acres of land adjacent to Interstate 5 (I-5) is designated for possible commercial use. However, KWBA has agreed not to sell or use the 490 acres as a condition of the Monterey Settlement Agreement.

Implementation of the KWB has altered the physical use of the land; however, overall land use and designations have not changed. The operation of percolation ponds is compatible with the surrounding existing uses. No commercial, retail, office, residential or other uses were developed, and an established community has not been divided. In addition, development of uses on the KFE property was consistent with the HCP. Therefore, the impact of the KWB on land use is considered to be *less than significant*.

## **G. Hazards and Hazardous Materials**

### **1. Existing Conditions in 1995**

In the 1980s, the Department began exploring the feasibility of developing an SWP groundwater storage facility in Kern County, which it called the KWB. As envisioned, the KWB was to consist of a series of “elements,” which would be geographically separate projects that would be operationally integrated. In 1988, Tenneco West sold approximately 20,000 acres of land in the Kern Fan area to the Department, which was intended to be used for development of one of these groundwater storage elements – the KFE. Prior to the Department acquiring the KFE property, the land was historically used for agricultural production. Once the land was acquired by the Department, it continued to be farmed by tenants for several years. One of the tenants’ leases was terminated in 1989. Then in 1991, at the peak of the drought, all the remaining tenants leases were terminated, and thereafter the lands were fallowed.

The hazards and hazardous materials setting for the KFE property was described in the Department’s 1990 Supplemental EIR for the first stage of the KFE of the KWB project (“1990 Supplemental EIR”). The setting described was generally related to the hazardous materials present in the soils on the KFE property. The 1990 Supplemental EIR described the results of soil sampling done throughout the KFE property to characterize potential contamination. Pesticides, herbicides, and other contaminants were found in soil samples near the pond sites, with isolated pockets of petroleum compounds found near oil pipelines or facilities.<sup>xxiv</sup> Soil samples were used to determine the safest location for the construction of the percolation ponds. In addition, the 1990 Supplemental EIR identified mitigation measures in the form of further testing and monitoring of the soil and groundwater in the area of the percolation ponds to prevent future contamination of groundwater or potential for release of contaminants.<sup>xxv</sup>

### **2. Effects of Transfer, Development, and Operations**

Prior to 1995, approximately 300 acres of shallow percolation ponds existed on the KFE property. These ponds had been constructed before the Department acquired the property. Between 1995 and 2003, KWBA constructed 4,699 acres of recharge ponds within the Recharge Sector and 2,415 acres of ponds within the Farming Sector, for a total of 7,114 acres of recharge ponds (see Section V.C.2.a). The KWBA also constructed the Kern Water Bank Canal; a six-mile long earthen canal extending from the Kern River to the California Aqueduct.<sup>xxvi</sup> The construction of percolation ponds resulted in ground-disturbing activities that could have exposed construction workers to residual chemicals associated with past and present agricultural practices involving the use of pesticides, fungicides, and similar agricultural products on crops and soils.

Soil samples were used to determine the safest location for the construction of the percolation ponds. In addition, the 1990 Supplemental EIR identified mitigation measures in the form of further testing and monitoring of the soil and groundwater in the area of the percolation ponds to prevent future contamination of groundwater or potential for release of contaminants.<sup>xxvii</sup>

Residues of agricultural chemical products in farmed soils as a result of routine agricultural operations are not typically managed as hazardous waste when used in accordance with adopted laws and regulations. Nonetheless, individuals performing excavation and grading activities would be at a greater risk of exposure to agricultural chemical residues in soil through inhalation of dust from soil movement. Construction of the ponds would also involve the use of heavy equipment that would contain fuels and lubricants. These products contain hazardous compounds, and an accidental release of these materials could injure construction workers, contaminate soil or water, or present a fire/explosion hazard.

Construction contracts included specific language requiring contractors to comply with applicable hazardous materials management laws and regulations adopted at the State level in Titles 19 and 22 of the CCR, which address proper storage and disposal of substances such as fuels. Title 8 of the CCR also addresses the use of hazardous products in the work environment, which would apply to construction contractors. The potential for inadvertent spills of materials, which could affect nearby surface water bodies or groundwater, was managed through construction site Best Management Practices (BMPs). Therefore, impacts would be *less than significant*.

## **H. Noise**

### **1. Existing Conditions in 1995**

The KFE property consists of 19,900 acres of land located in Kern County southwest of Bakersfield. The KFE property lies on both sides of the Kern River but does not include the river itself, or the lands within the river levees. In 1995, there were no major structures on the KFE property except for I-5, the Cross Valley Canal, and some abandoned tanks and other oil field equipment.

The KFE property was farmed for many years until the mid-1980s. After the Department acquired the property, it continued to be farmed by tenants for several years. One of the tenants' leases was terminated in 1989. Then in 1991, at the peak of the drought, all the remaining tenants leases were terminated, and thereafter the lands were fallowed. Therefore, vehicular traffic was the primary source of noise throughout the area. The KFE property is primarily bisected by rural roads, SRs 99, 119, 166, and 223, and I-5.

### **2. Effects of Transfer, Development, and Operations**

Between 1995 and 2005, as part of the KWB, approximately 7,114 acres of land were converted to shallow percolation ponds, and a six-mile long earthen canal (the Kern Water Bank Canal) and several wells and pump stations were built. Unpaved roads were built to provide access to the new facilities. However, there were no noise-sensitive land uses located in close proximity to the construction sites that were adversely impacted by daytime construction noise and groundborne vibration levels. Routine maintenance of the new facilities results in temporary noise levels. Operation of the KWB requires pumping to convey water to percolation ponds, to extract water from underground, and to convey water in the Kern Water Bank Canal. Electric

motors power the pumps. A representative range of noise levels for pumps is estimated to be 68 to 72 dBA (see Table 12) at 50 feet. [Comment: Note that the reference to Table 9.12-3 in ADEIR is incorrect; the correct reference is Table 9.12-5.] The installation and operation of pumps associated with the construction of percolation ponds on the KFE property attributable to the KWB would result in an increase in noise emissions from pumps compared to pre-1995 conditions. However, increased noise levels would not affect sensitive receptors because the pumps are located in relatively remote areas far from homes and businesses. Ongoing maintenance of the new facilities is intermittent and not considered a substantial source of increased noise levels at sensitive land uses. Therefore, these land use changes are considered to have a *less-than-significant impact*.

Construction Equipment	Noise Levels in dBA Leq at 50 feet <sup>1</sup>
Front Loader	73–86
Trucks	82–95
Cranes (moveable)	75–88
Cranes (derrick)	86–89
Vibrator	68–82
Saws	72–82
Pneumatic Impact Equipment	83–88
Jackhammers	81–98
Pumps	68–72
Generators	71–83
Compressors	75–87
Concrete Mixers	75–88
Concrete Pumps	81–85
Back Hoe	73–95
Pile Driving (peaks)	95–107
Tractor	77–98
Scraper/Grader	80–93
Paver	85–88
Note: 1. Machinery equipped with noise control devices or other noise-reducing design features does not generate the same level of noise emissions as that shown in this table. Source: U.S. EPA 1971 as presented in City of Los Angeles 1998.	

## I. Cultural and Paleontological Resources

### 1. Existing Conditions in 1995

#### Archeological Resources

The Southern Valley Yokuts included a large number of distinct small tribes. The groups depended on diverse resources, but freshwater lake and marsh resources were predominant.<sup>xxviii</sup> Their territory was in the southern end of the San Joaquin Valley, around Tulare, Buena Vista and Kern lakes, and the lower ends of the streams that fed those lakes.<sup>xxix</sup> The *Wechihit* Yokuts lived on the lower Kings River, and undoubtedly traded and intermarried with the *Holkoma* and *Wobonuch Mono*; the *Koyeti* Yokuts lived on the lower Tule River, and probably interacted closely with their relatives, the *Yawdanchi*, upstream. On the Kern River, the *Yawelmani*

occupied present-day Bakersfield and the stream course for some distance upstream, as indicated by archaeological evidence. The *Tachi* Yokuts occupied land that comprises present-day Kings County. The KFE property falls within *Yawelmani* Yokuts territory, and sites have been recorded in the area.<sup>.xxx</sup>

## Paleontological Resources

During the Miocene Epoch, most of Kern County was an ocean bay which extended as far north as Redding and as far south as Bakersfield. The waters lapped against rolling hills that were soon to be pushed up to form the Sierra Nevada Mountains. Northeast of Bakersfield, where the modern Kern River leaves the Sierra Nevada, a river flowed into the bay. The river carried sediments and the remains of plants and animals into the bay. These materials, along with the plentiful remains of marine organisms, sank to the bottom and much of the organic remains were fossilized. Subsequent geologic events pushed up the sediments, and they then eroded to form the rolling hills that include Sharktooth Hill. Exposed in these hills is the bone bed that formed from those fossil-rich sediments. The Sharktooth Hill bone bed encompasses more than 110 square miles, most of it deep underground only exposed east of the Bakersfield area.<sup>.xxxii</sup>

This bed is the most fossil-rich Miocene marine bone bed in the world. And, like the great La Brea discoveries in Los Angeles provide for the Pleistocene, the Sharktooth Hill bone bed offers a surprisingly complete view of the marine Miocene period. The bed contains the fossilized remains of all major marine groups of animals.<sup>.xxxiii</sup>

Kings County is home to Kettleman Hills, which contain three geological rock deposits from the Etchegoin, San Joaquin, and Tulare Formations, with the Etchegoin Formation being the oldest and the Tulare Formation being the youngest.<sup>.xxxiv</sup> The Kettleman Hills contain an abundance of invertebrate, vertebrate, and botanical fossils from the Pliocene Epoch (4.5 to 2.0 million years old). The area contains 370 registered fossil localities, while there are a total of approximately 570 registered fossil localities throughout the entire Kings County.<sup>.xxxv</sup> Many of these fossils were preserved and deposited within a complex integrating fresh water, estuarine, and marine conditions directly related to the sea that existed during the Tertiary Period of the Cenozoic Era. The Kettleman Hills continue to produce the well preserved fossils they are famous for today.

## 2. Effects of Transfer, Development, and Operations

Prior to 1995, approximately 300 acres of shallow percolation ponds existed on the KFE property. These ponds had been constructed before the Department acquired the property. Between 1995 and 2003, KWBA constructed 4,699 acres of recharge ponds within the Recharge Sector and 2,415 acres of ponds within the Farming Sector, for a total of 7,114 acres of recharge ponds (see Section V.C.2.a). The KWBA also constructed the Kern Water Bank Canal, a six-mile long earthen canal extending from the Kern River to the California Aqueduct.<sup>.xxxvi</sup>

As previously noted in Impact 9.13-1A, prehistoric sites have been recorded in the Kern Fan Element, and paleontological deposits have been identified in the southern portion of the county. Some of these deposits are exposed while others are underground. Ground disturbance

associated with the construction of groundwater storage facilities could expose paleontological resources. Prior to construction, archeological investigations were completed in the Kern Fan Element and for the Kern Water Bank Habitat Conservation Plan/ Natural Community Conservation Plan (HCP/NCCP). Some of these investigations recorded significant archeological sites at or near the Kern Fan Element project area.<sup>xxxvi</sup> Mitigation measures were also adopted to ensure that if previously unidentified archeological resources were discovered during construction activities, that work would cease and a qualified archaeologist would examine the discovery and make recommendations for appropriate data recovery.

Therefore, the proposed project is considered to have had a *less than significant impact*.

## **J. Traffic and Transportation**

### **1. Existing Conditions in 1995**

The KFE property consists of 19,900 acres of land located in Kern County southwest of Bakersfield. The KFE property was farmed for many years until the mid-1980s. After the Department purchased the land in 1988, it continued to be farmed by tenants for several years. One of the tenants' leases was terminated in 1989. Then in 1991, at the peak of the drought, all the remaining tenants leases were terminated, and thereafter the lands were fallowed. By 1995, introduced annual grasses and forbs had colonized the land. The area is traversed by I-5, SRs 99, 119, 166, and 223 and paved and unpaved rural roads.

### **2. Effects of Transfer, Development, and Operations**

Prior to 1995, approximately 300 acres of shallow percolation ponds existed on the KFE property. These ponds had been constructed before the Department acquired the property. Between 1995 and 2003, KWBA constructed 4,699 acres of recharge ponds within the Recharge Sector (see Section V.C.2.a) and 2,415 acres of ponds within the Farming Sector, for a total of 7,114 acres of recharge ponds. KWBA also constructed the Kern Water Bank Canal, and a six-mile long earthen canal extending from the Kern River to the California Aqueduct.<sup>xxxvii</sup> Unpaved roads were constructed to provide access to the new facilities. Traffic volumes on some rural roads temporarily increased during the construction period. In addition, routine maintenance of the new facilities resulted in a permanent increase in vehicular traffic. While there had been vehicular traffic related to agricultural activities on the KFE property through the 1991, in the several years prior to 1995, the land now occupied by the ponds lay fallow and generated little or no traffic. The small increases in vehicular movements attributable to construction and operation of the KWB had little adverse effect on traffic flow on the affected rural roads. Consequently, the KWB is considered to have a less-than-significant impact.

## **IX. Summary**

Compliance reports from 1999 through 2005 were reviewed to determine construction activities, recharge and extraction operations, wildlife use of the site, vegetation trends, and identify any

incidences of “take” in light of the Kern Environmental Permits. Since 1999, a number of structures have been added to the site (canals, recharge ponds, levees, etc). These structures were developed based on the HCP/NCCP guidelines. Section VI highlights recharge and extraction operations at the Kern Water Bank that was determined from the Annual Reports and from staff at the KWCA.

Several “no take” projects have been authorized on the KWB property. The qualified biologists who spent many hours at the KWB since 1999 observing, photographing, and trapping, have reported no instances of “take” nor have any reports of “take” from staff or third party operators on the site been received. Due to the construction of more recharge ponds and the growth of riparian trees and other native vegetation, waterfowl and other bird species numbers and biodiversity have generally increased since 1999. Other wildlife species have benefited from the restoration and preservation activities at the KWB (coyotes, bobcat, etc.), however; numbers of the endangered San Joaquin kit fox and Tipton kangaroo rat continue to be low.

Based on the Annual Reports, and conversations with staff at the KWBA, the Department of Water Resources concludes that the KWB is operating as intended and within the confines of the HCP/NCCP.

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